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The Implementation of PEAK Relational Training System in a Special Education Classroom

Kelsey Leachko
Otterbein University, kels.leachko@gmail.com

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Kelsey B. Leachko

Otterbein University

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Dr. Diane Ross	_____	_____
Advisor	Signature	Date
Dr. Allison McGrath	_____	_____
Second Reader	Signature	Date
Dr. Dee Knoblauch	_____	_____
Third Reader	Signature	Date

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VITA

Teaching Experience

2020 - Present	Intervention Specialist- Moderate/Intensive Abraham Depp Elementary School Dublin City Schools Plain City, Ohio
2018 - 2020	Intervention Specialist- Moderate/Intensive Albert Chapman Elementary School Dublin City Schools Powell, Ohio
2017 - 2018	Intervention Specialist- Moderate/Intensive Prairie Norton Elementary School Educational Service Center of Central Ohio Columbus, Ohio
2016 - 2017	Early Childhood Intervention Specialist New Albany K-2 Educational Service Center of Central Ohio New Albany, Ohio

Education

2020	Master of Arts in Education Special Education Otterbein University Westerville, Ohio
2015	Bachelor of Science in Education Early Childhood Education/Early Childhood Intervention Specialist Otterbein University Westerville, Ohio

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ABSTRACT

This study was an instructional inquiry project using a single participant research design and mixed methods data collection. The study investigated the implementation of PEAK (Promoting the Emergence of Advanced Knowledge) Relational Training System: Direct Training Module (Dixon, 2014), specifically when focused on the behavior of a second-grade student with ASD within a specialized learning center. By conducting a pre-assessment with a single subject, deficits in foundational skills were identified and three focus behaviors were chosen for intervention. PEAK was then implemented using a multiple baseline design to teach and reinforce the behaviors. The progress of the intervention was evaluated using data collection during implementation. The driving questions of this study were, "What is the relationship between implementing PEAK Relational Training System and the foundational skills of a second-grade student with Autism Spectrum Disorder?" and "How can PEAK Relational Training System be implemented in a specialized learning center?". The data showed that the student increased in score after the implementation of the intervention and observations regarding participant behavior showed improvement through analysis of the researcher journal.

SECTION ONE

Introduction

Delivering individualized instruction that meets the diverse needs of students with significant cognitive disabilities, such as Autism Spectrum Disorder (ASD), is the key principle to special education (Turnbull, Turnbull Wehmeyer, & Shogren, 2020). Students who receive special education services often receive specially designed instruction from a special education teacher. This instruction should be focused on different Individualized Education Program (IEP) goal areas including academics, behavior, independence, self-help and functional skills. Many times, students with moderate to intensive support needs receive instruction within a self-contained special education classroom. This specific setting may include students from several grade levels who possess skills of varying abilities. For example, students with multiple disabilities, autism spectrum disorder or intellectual disability may require intensive support needs (Turnbull et al, 2020). These unique learners require individualized instruction geared towards their abilities and cognitive levels and benefit from accommodations and modifications. For example, visual responses, multiple choice responses, repetition of questions, prompts to stay on task, frequent reinforcement and scheduled sensory breaks are often used as accommodations to instruction. Providing this specialized instruction requires the knowledge of modified or extended academic content standards, interventions, and behavior management techniques. All of these factors assist in creating academic experiences suitable for students with significant needs, delivered by a special education teacher or intervention specialist.

In working with the specific population of individuals with ASD, I have discovered a need to provide my students with instruction on skills outside of academic content areas that may present as a deficit due to the nature of their disability. According to Turnbull et al (2020), individuals with ASD often demonstrate social-communication impairments, atypical language development, problem behavior and differences in intellectual functioning. Many of my students demonstrate weaknesses in language and communication, social skills and foundational skills. Foundational skills are the baseline skills that allow an individual to be independent, communicate, play and gain more skills through learning. I believe teaching these skills are a necessary component when teaching my students who encase a wide range of abilities. I currently use various research-based interventions that are not given in a curricular format. Throughout my teaching experience, I have yet to discover a curriculum that is designed to allow me to teach and practice foundational skills with my students who have moderate to severe disabilities that also encompasses a group of multi-age students with a vast range of abilities.

My teaching practice includes 3.5 years of teaching students with disabilities in multiple school districts. I have experience working with preschool and school aged students with disabilities including autism spectrum disorder, hearing and/or visual impairments, multiple disabilities and intellectual disabilities. In my current teaching position as an Intervention Specialist serving students with moderate to severe disabilities, I provide direct instruction in individual and group settings to 10 students, including nine who have a diagnosis of ASD. My specialized learning center (SLC) includes students in kindergarten through fifth grade with goals focused on mathematics, reading, functional academics, life skills, adaptive skills, behavior and independence. The

instruction that I provide is based on each students' IEP and Ohio Academic Content Standards-Extended. Thus far in my teaching experience, I find myself frequently adapting and modifying learning activities to meet the needs of all of my students which is both challenging and very time consuming. I currently utilize three separate curriculums to support my instruction of academic skills while also searching for research-based activities focused on teaching foundational skills. All of these factors that I have encountered throughout my position as an intervention specialist have led me to question what curriculum I can utilize as my main source of instruction in foundational skills.

The question that drives my project has allowed me to think specifically about my students and their needs. The student that I have chosen as my focus subject is one who exhibits definite delays in foundational skills which prevent him from increasing his independence in the school environment. Through my professional exploration within the school district, I have acquired access to PEAK (Promoting the Emergence of Advanced Knowledge) Relational Training System (Dixon, 2014). This program is designed as an evaluation and curriculum guide focused on teaching basic and advanced language skills to include foundational skills, based on the science of behavior analysis. PEAK involves teaching skills in a way that learners are able to generalize and learn untaught skills more easily. I have chosen to study this curriculum because it aligns with the content standards and can be directly related to IEP goals. My focus student will be participating in the Alternate Assessment and the structure of PEAK is similar to the structure of the assessment which will prepare him in responding to prompts and questions in a familiar way. In the past two years, I have attempted to implement PEAK in my classroom as a

means to streamline instruction for my students, although I have not received formal training on the application of PEAK. Many other teachers in my school district have implemented PEAK as well and I believe it will be beneficial to share the information from my studies with my colleagues. The relevance of implementing PEAK in my classroom is to investigate if this curriculum will bridge the gap in instruction of foundational skills for my students with ASD and inform my decision to implement this curriculum with all of my students.

Purpose of the Study

This study investigates the implementation of PEAK Relational Training System: Direct Training Module (Dixon, 2014), specifically when focused on the behavior of a second-grade student with ASD within a specialized learning center. By conducting a pre-assessment with a single subject, deficits in foundational skills were identified and three focus behaviors were chosen for intervention. PEAK was then implemented using a multiple baseline design to teach and reinforce the behaviors. The progress of the intervention was evaluated using data collection during implementation. Following, the result of the intervention was evaluated by administering a post assessment to determine changes in score over time. The purpose of the present study was to evaluate the relationship between implementing PEAK and the foundational skills of a student with ASD. The secondary focus was the discovery of how to implement PEAK Relational Training System within an SLC. The research questions are written to examine both the primary and secondary focus.

Research Questions

1. What is the relationship between implementing PEAK Relational Training System and the foundational skills of a second-grade student with Autism Spectrum Disorder?
2. How can PEAK Relational Training System be implemented in a specialized learning center?

SECTION TWO

Literature Review

To properly implement a special education curriculum, it is necessary to understand the theory of learning that any given curriculum is grounded in. Understanding how unique learners acquire new skills and knowledge is a key component in selecting research-based strategies for instruction. Special education is based on learning theories, behavior management, skill sets and skill deficits. Before we can begin to address these specific skill sets and deficits, the background knowledge of disabilities and learning styles need to be considered. The following section will discuss the behaviorist theory and relational frame theory as they relate to learning and development. Autism Spectrum Disorder (ASD) will be defined with regards to the prevalence, identification and characteristics of the disability. This review of literature will inform the knowledge of relevance to this study which explores the implementation of PEAK Relational Training System and its relationship with the behavior of one student in a specialized learning center. The following section will discuss the theories that drive the PEAK curriculum as well as other behavior focused instructional strategies including pivotal response treatment and applied behavior analysis.

Educational Learning Theories

There are numerous different theories of learning and development that cognitive development psychologists have constructed which then have a potential influence on curriculum development (Strauss, 2000, p. 30). Two major theories are used to inform the cognitive structure in the design of PEAK Relational Training System. “The PEAK system capitalizes on the advances of [Relational Frame Theory] in understanding and

promoting complex human behavior (i.e. language and cognition) as well as the efficiency of training to do derived relational responding" (Reed & Luiselli, 2016, p. 207). The two major theories providing the framework for PEAK Relational Training System include Radical Behaviorism, pioneered by B.F. Skinner and Relational Frame Theory, developed by Steven C. Hayes. Understanding the history of development for PEAK is an important piece of knowledge when making the choice to implement the curriculum.

Behaviorist theory.

The behaviorist approach to learning is a dominant learning theory that drives many behavior analytic strategies (Torneke, 2010). As described by Torneke, "Verbal behavior is a human behavior that is governed by antecedents and consequences" (2010, p. 33). B.F. Skinner explains that "Verbal behavior is usually the effect of multiple causes" and the conditions and functions are therefore identified to account for the dynamic characteristics of verbal behavior. (Skinner, 1957). Verbal behavior involves a speaker and a listener within the same skin engaging in activities described as "thinking" where the speaker manipulates behavior and as a listener, reviews it to tease out weak behavior and strengthen new responses (Skinner, 1957). An important piece of information to the behaviorist theory leads to the understanding that "In all verbal behavior under stimulus control there are three important events to be taken into account: a stimulus, a response and a reinforcement" (Skinner, 1957, p. 81). These three are all contingent upon one another as the stimulus provokes a response which is likely to be reinforced (Skinner, 1957). The tact is a verbal operant in which a response of given form is evoked, which is the most important of verbal operants (Skinner, 1957). Verbal

behavior usually occurs only in the presence of a listener and is reinforced upon the observation of the behavior, which relates to the term “the audience” (Skinner, 1957). The six types of functional relations in verbal behavior include the mand, echoic, textual and intraverbal behavior, the tact and the audience (Skinner, 1957). The mand is a given form of response which produces a given reinforcement. In echoic behavior, an auditory response is produced where textual and intraverbal produces a written or printed response (Skinner, 1957). The tact is a label for a stimulus that is maintained by praise. For example, if a child sees a dog and says “dog!”, the response would be maintained by praise such as, “You’re right! That is a dog.” The same stimulus can be presented to produce responses in these different kinds of verbal behavior (Skinner, 1957). A child is taught information when the reinforcement is made contingent upon a response which is an appropriate relation to a stimulus (Skinner, 1957). “Advances in verbal behavior approaches have shown that early learning skills can be taught under various sources of stimulus control and in natural environment settings (Johnson, Kohler, & Ross, 2017), but once these pre-requisite learning skills have been established, instructional programming can advance to more advanced, relational targets” (Dixon, Belisle, McKeel, Whiting, Speelman, Daar, & Rowsey, 2017, p. 501). PEAK was created to present learning in the manner of early language acquisition using the pre-requisite skills to begin contingency based or directly trained learning (Dixon, 2014). Stimuli is identified within an environment that is conducive to learning for a student and allows for feedback for a student to receive instructional programming in the manner of verbal behavior relations (Dixon, 2014). Skinner explains that a learning curve should be considered and examined since “Complex behavior is acquired at different speeds not because of great differences

in the effect of reinforcement, but because of interactions among responses and stimuli" (Skinner, 1957, p. 204). Skinner describes verbal behavior as having many favorable characteristics as an object of study since verbal language is easily observed and there are substantial facts when observing verbal behavior. The setback is that a functional treatment of verbal behavior has been long delayed (Skinner, 1957).

Relational frame theory.

Hayes proposed relational frame theory (RFT) to provide a more comprehensive approach to understanding verbal behavior (Reed & Luiselli, 2016). "RFT is an account of human language and cognition that proposes that operant learning of relations paired with contextual cues derive arbitrary stimulus reactions" (Reed & Luiselli, 2016, p. 206). This process involves the coordination of different relational frames through operant learning. "The term "relational frame" is used to specify a pattern of arbitrarily applicable relational responding involving mutual entailment, combinatorial entailment, and the transformation of stimulus function" (Hayes, 1996, p. 226). For example, derived naming is a relational frame in which an individual verbally utters a name of a person in the presence of a child and then reinforces any response towards that person (Barnes-Holmes & Barnes-Holmes, 2000). The behaviors defined by B.F. Skinner are separated into nonverbal and verbal behavior through the relational frame theory. RFT argues that there are an arbitrary number of types of relations along which stimuli can be related (Reed & Luiselli, 2016). RFT is based upon the idea that membership of a functional behavioral class is defined by the functional relation between responding and its antecedents and consequences which may take on an infinite variety of forms (Hayes, 1996). An extension of this idea is that relational responding can occur among events rather than

properties of events (Hayes, 1996). The development of PEAK is based on the premise of RFT and includes stimulus relations within the learning system. The four relations are reflexivity, symmetry, transivity and equivalence (Dixon, 2015). These relations are presented on a spectrum of difficulty level to be sure that relational responses are established as durable and flexible and not bound by any certain stimuli within a program (Dixon, 2015). This is connected to the RFT idea that responses are able to be generalized and are not attached to any specific quantity or stimuli. Reflexive relations are made among stimuli by relating a stimulus to itself (Dixon, 2015). For example, a learner is given a picture and asked to match to the same in the presence of a series of pictures (Dixon, 2015). Symmetry involves making a derived relation in the opposite direction of a trained relation such as learning that a picture of a car is called a "CAR" and connecting this information using stimuli (Dixon, 2015). Transivity occurs when a learner must make a derivation across stimuli although the two items being related were never paired together during the direct training (Dixon, 2015). The equivalence relation occurs when the other relations are paired together (Dixon, 2015). The advances in knowledge of RFT allows us to understand the idea that language takes place within relational frames and can be generalized to infinite settings. Behavioral literature is mainly focused on implementing verbal operant procedures with children with autism, but to consider RFT is a critical addition to behavioral literature (Hayes, 1996).

Autism Spectrum Disorder

Christensen et al. (2018) describe ASD as "a developmental disability characterized by social and communication impairments and by restricted interests and repetitive behaviors" (p. 2). According to Christensen et al., this disorder was previously

diagnosed with specific criteria outlined in the 1994 publication of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) which included five subtypes of autism including autistic disorder, Asperger's disorder, pervasive developmental disorder–not otherwise specified (PDD-NOS), childhood disintegrative disorder, and Rett's disorder. Since the publication of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) the diagnostic criteria have since changed to redefine autism as a single disorder and includes other changes in the diagnostic classification of ASD (Christensen et al., 2018). The diagnosis criteria for autism requires information for a specific severity level for each individual.

Prevalence.

Through evaluating the changes in the prevalence of ASD, there is an identified significant increase in a short time period (Rice, Rosanoff, Dawson, Durkin, Croen, Singer, & Yeargin-Allsopp, 2012). There have been multiple reports published through the Autism and Developmental Disabilities Monitoring Network (ADDM) providing a prevalence estimate for autism spectrum disorder (Sheldrick & Carter, 2018). The ADDM noted significant growth in the average prevalence of ASD across multiple years during their 2000-2012 state-level trend study (Sheldrick & Carter, 2018). The trends in ASD diagnoses have been researched and reported to determine possible reasons for the change in prevalence (Rosenberg, Daniels, Laws & Kaufmann, 2009). The changes and expansion in classification of ASD is likely contributing to the increase in number of diagnoses (Rosenberg et al., 2009). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) provides the current guidelines for diagnosis of mental disorders, including ASD (Christensen et al., 2018). Over the last two decades, the

knowledge base surrounding ASD has increased as well as for the diagnostic criteria when identifying individuals with this disability (Rice et al., 2012). The diagnosis criteria have changed due to a growth in information regarding ASD and a better understanding of symptoms which may in turn lead to an increase in diagnoses at the clinical level (Rosenberg et al., 2009). In general, factors may include "better analytic tools, better identification and screening methods, changes in diagnostic criteria, increased awareness among parents and clinicians and changes in the availability of services" (Rice et al., 2012, p. 3).

According to the Center for Disease Control (CDC), "current estimates are that ASDs occur in about one percent of children" (Rice et al., 2012, p. 2). The ADDM estimate on average, "one in 88 children were identified with an ASD" (Rice et al., 2012, p. 6). The importance of prevalence estimates relates to the availability of services and policy planning as well as identifying potential risk factors for ASD (Rice et al., 2012). The rise in diagnoses of autism spectrum disorder correlate with the increased availability of evidence-based treatments, therapies due to the increasing number of students in school settings with ASD. Bilaver, Cushing, and Cutler (2015) identify the need for data on the use of specific ASD treatments. In a study examining the prevalence and correlates of educational intervention utilization among children with ASD, authors selected four services into examine reports and determine the frequency of service treatments (Bilaver, Cushing, and Cutler, 2015). Findings showed that speech services were of the most frequently received and behavior therapy was substantially lower. The vast majority of children received their services only in a school setting. According to Bilaver et al., "Over half of the children with ASD are still not receiving the most evidence-based type

of therapy", referring to behavior therapy (2015). The utilization of treatments that individuals receive is connected to the symptoms and characteristics of Autism Spectrum Disorder.

Characteristics of ASD.

It is well known among present research that core symptoms and characteristics of children with ASD include difficulties with language and communication (Mayo, Chlebowski, Fein, Eigsti, 2012). The following five criteria are listed with examples in the DSM-5 (American Psychiatric Association, 2013):

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history.

B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history.

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level.

Individuals with ASD often present with atypical language development, however this is not a key component of diagnosis within the DSM-5 (Turnbull, Turnbull, Wehmeyer, & Shogren, 2020). Rather, the criteria for autism in the social communication domain have been merged with aspects related to language. Several impairments involving communication irregularities include interrupting when others are communicating, focusing on one topic only, limited interactions, reversing pronouns and echoing other people's language (Turnbull et al, 2020). DSM-5 identifies three criteria that must be present as social communication impairments before an individual may be classified as having autism spectrum disorder (Turnbull et al, 2020).

A. Social-emotional reciprocity- taking turns in communication and throughout activities, interacting with others around shared interests, taking initiative in social situations and sharing of affect with others.

B. Nonverbal communication- body language, facial expression, gestures, eye contact, and the alignment of language and nonverbal behaviors.

C. Maintaining relationships- adapting behavior to the expectations of particular contexts, making friends and lacking interests and initiative in approaching peers.

Children with ASD also exhibit challenges in the area of adaptive functioning (Di Rezze, Duku, Szatmari, Volden, Georgiades, Zwaigenbaum, ...Waddell, 2019). Adaptive functioning is described as practical skills related to communication, daily living skills (DLS) and socialization (Di Rezze et al., 2019). The area of adaptive behavior also includes the ability to use language to make needs known, learn functional academic activities, relate to others and function independently (Milne, McDonald, & Comino,

2012). Deficits in these skills have been reported in young children with autism which typically impacts their foundational social skills later in life (Ventola, Saulnier, Steinber, Chawarska, & Klin 2011). “Supporting the development of DLS is particularly important to ensure future independence and successful transitions to adulthood for children with ASD” (Di Rezze et al., 2019, p. 1).

Identification of ASD.

Much of the assessment and treatment for individuals with ASD can occur within educational settings which has an influence on the evidence-based practices that may be chosen for an individuals’ treatment plan. A commonly used measure of adaptive functioning is the Vineland Adaptive Behavior Scales (Vineland, 2016) which can provide information in the categories of daily living skills, domestic activities and community management (Di Rezze et al., 2019). Results of the Vineland measure can provide information regarding deficits in specific adaptive behavior skills that will then need to be taught to individuals. Some research indicates the age of diagnosis, stereotyped behavior, cognitive and language ability are covariates impacting DLS scores (Di Rezze et al., 2019). Determining the adaptive behavior abilities of individuals is useful for diagnostic classification as well as treatment planning (Balboni, Tasso, Muratori, & Cubelli, 2015). When planning treatment, research-based interventions may be chosen specifically to teach a specific skill or set of skills and may include trial and error when selecting the most appropriate intervention for the individual.

Research-based interventions

“Children demonstrating more flexibility in engaging their environments have more opportunity to explore their environments and better learn adaptive skills” (Di

Rezze et al., 2019). Interventions need to include the treatment of communication skills, social skills and adaptive behavior, all of which are critical for students with ASD (Mohammadzaheri, Koegel, Rezaee, & Rafiee, 2014). Several research-based interventions that are focused towards the population of individuals with ASD include applied behavior analysis (ABA), pivotal response treatment (PRT) and PEAK relational training system (PEAK).

Applied Behavior Analysis.

According to Lovaas (1987), many treatment approaches for individuals with ASD "are derived from the field of behavior analysis (ABA) and based on theories of learning and operant conditioning, as they are evidence-based" (Mohammadzaheri, Koegel, Rezaee, & Rafiee, 2014, p. 1). Direct observation, measurement and functional analysis are used in ABA. Antecedent stimuli and consequences are used to change environmental events and produce practical changes in behavior" (Mayer, Sulzer-Azaroff, & Wallace, 2018, p. 6). The approach of ABA is structured and includes adult selected, discrete intervention targets, which are then addressed through multiple trials of antecedent-behavior-consequence chains (Mohammadzaheri et al., 2014). ABA describes and functionally addresses behavior that are socially important by teaching and supporting constructive, adaptive and safe learning and by reducing detrimental behavior. Typically, a problem or challenge is identified and addressed, which then leads to designing and implementing an ABA program. Creating an environment conducive to learning, specifying goals, identifying current reinforcers and collecting useful data are key factors to promoting positive change using ABA. Discrete Trial Training (DTT) is a frequently used method for teaching communicative skills to children with autism. Tasks

are broken down into short trials and allow for focus on specific goals within an ABA program. The above factors are necessary in creating a favorable environment for implementing DTT. Utilizing reinforcers and motivators as well as collecting data are required for successful implementation. “A discrete trial is a single cycle of behaviorally-based instructional routine consisting of four or five parts” (Mayer, Sulzer-Azaroff, & Wallace, 2018, p. 390):

1. Presenting, if necessary, the appropriate antecedent stimuli- e.g. a short, clear instruction or a cue to which the client can respond.
2. Providing a temporary prompt (if necessary), such as showing (or verbally instructing or guiding) the client’s correct responding.
3. Waiting for the learner to emit the skill or behavior that is the target of the instruction.
4. Providing the reinforcer, such as praise or a high-preference item designed to motivate the client to continue responding correctly contingent on the behavior
5. Ending with an inter-trial interval consisting of a brief pause between consecutive trials.

The methods of ABA first demonstrated by Lovaas, Koegel, Simmons and Long (1973) as well as additional findings have contributed to the general acceptance of ABA as the treatment of choice for children with autism. The direct training module of PEAK focuses on directly trained learning using DTT as it is supportive of early language acquisition and only requires a few pre-requisite skills to associate a specific response with a specific question (Dixon, 2014). The PEAK system is consistent with Skinner’s

verbal behavior merging verbal operant training and derived relational responding (Dixon, Belisle, McKeel, Whiting, Speelman, Daar, & Rowsey, 2017).

Pivotal response treatment.

Through the use of operant teaching principles, pivotal response treatment (PRT) has been implemented with individuals diagnosed with ASD to target a wide range of skill deficits (Mohammadzaheri et al., 2014). The PRT model is naturalistic and allows for child choice, task variation, reinforcing attempts and use of direct natural consequences. Communication and social skills are targeted through the PRT approach, which is based on behavioral principles of ABA. Mohammadzaheri, Koegel, Rezaee, and Rafiee (2014) conducted a study to compare PRT and ABA with 30 participants on the autism spectrum between the ages of 6 and 11 years old. The treatment took place in a small room within a public school using a one-to one teacher-child format. Sessions were focused on "improving verbal expressive communication by expanding the child's Mean Length of Utterance (MLU)" (Mohammadzaheri et al., 2014, p. 2772). The PRT structure in this study included many components that were motivating for the participants including a variety of child-chosen foods, toys and reward activities. Children would participate in a naturalistic setting by communicating requests and they would receive reinforcement for expanding these verbal utterances. Findings showed that the individuals receiving the PRT treatment showed significantly greater gains in their MLU than the ABA group. In comparison, DTT is a "highly structured behavioral intervention and PRT is a naturalistic behavioral intervention. Although the instructional strategies have many commonalities, the context of delivery differs with PRT being embedded within motivating, naturally occurring situations and DTT being decontextualized"

(Jobin, 2020, p. 339). A combination of structured and naturalistic procedures may be most effective and often behavior analytic approaches share common features and may combine interventions in different ways (Jobin, 2020). A few investigators have examined whether the approaches of DTT or PRT may be the most appropriate for different children. “Variables that have been implicated in PRT responsivity include levels of stereotypy, toy play, approach, and avoidance” (Jobin, 2020, p. 339). Both PRT and DTT have been found to present similar acquisition patterns (Jobin, 2020). PRT and DTT are commonly used to teach expressive and receptive language, play, imitation, and other social skills. Two ABA based curricula for early intervention called STAR (Strategies for Teaching based on Autism Research) and Teaching Social Communication to Children with Autism were compared in a study completed (Jobin, 2020). Four children at risk for autism under the age of 3 were participants who received three 90-minute sessions per week of PRT and DTT including 45 minutes of DTT alone and 45 minutes of PRT alone. Sessions continued for 12 weeks. The treatment responses varied significantly across participants and domain areas. As stated by Jobin (2020), findings suggested that individual children respond uniquely to PRT and DTT which was consistent with the variable nature of ASD and treatment responsivity. This supported the previous statement that combining intervention methods and techniques are commonality within the field of ABA (Jobin, 2020). The choice of curriculum or method may be based on the specific domains for an individual or related to how the individual child responds to a specific method of instruction.

PEAK relational training system.

PEAK is a language curriculum dedicated to expanding language via the science of behavior analysis (Hahs & Jarynowski, 2019). The curriculum promotes independence and facilitates the development of new skills using previously learned behaviors. PEAK involves teaching skills in a way that learners are able to generalize and learn untaught skills more easily. Various research has been conducted to evaluate the effectiveness of ABA therapies and procedures but "there is a need to design and evaluate effective methods for infusing behavior analytic instructional technologies in school systems" (Dixon, Belise, Stanley, & Rowsey, 2018, p.1). The PEAK protocol contains an assessment and curriculum and includes the only two ABA protocols that have empirical support for reliability and validity of the assessment as well as for effectiveness of the curriculum (Dixon et al., 2018). "PEAK contains four comprehensive training modules: Direct Training and Generalization emphasize a contingency-based framework of language development, and Equivalence and Transformation emphasize an approach to language development consistent with Relational Frame Theory". The final two modules, PEAK Equivalence (Dixon, 2015) and PEAK Transformation (Dixon, 2016) are the only comprehensive manualized protocols emphasizing derived relational responding in children with autism that are supported by peer-reviewed investigations of treatment outcomes (Dixon, 2015).

In an initial evaluation of PEAK, a randomized control trial experimental arrangement was conducted using the PEAK protocol. Through this study, the procedures written in the PEAK curriculum were described as effective in teaching the skills indicated on the assessment and that the acquisition of skills were not observed in the

control group (Dixon et al., 2018). Since PEAK is frequently implemented by frontline school staff, there is a need to provide a long-term evaluation of the effectiveness of the curriculum when used as a systems-level intervention by teachers and direct care staff. "The instruction strategy recommended by PEAK is Discrete Trial Training (DTT) as it allows for the greatest control of stimuli presentation and immediate feedback" (Dixon, 2015, p. 54). Through DTT, responses to specific stimuli are organized into individual presentations called a trial (Dixon, 2015). Feedback for a trial is provided directly following the response. Correct responses are immediately reinforced, and incorrect responses are immediately corrected which minimizes the time between stimuli presentations and reinforcement of correct responses (Dixon, 2015). Learners begin to understand the relationship between the stimulus presentations and feedback for their response. "The DTT sequence includes the establishment of motivation, the presentation of the stimuli, reinforcement for correct responses and prompts plus the redelivery of stimuli for incorrect responses" (Dixon, 2015, p. 55). Implementing a DTT style of direct instruction is often the choice for a systems-level intervention by teachers and direct care staff which leads to the search for an autism curriculum that will provide guidance on implementation of DTT in a classroom setting.

Implementation of PEAK.

PEAK was created on the foundations of Skinner's verbal behavior approach as well as the foundation of ABA and includes an assessment and curriculum guide composed of the four modules. The modules include detailed instructions on conducting initial assessments and the individualized placement of clients into an appropriate skill range (Dixon, 2017). Each of the programs within PEAK outlines goals, materials and

typical stimuli and includes instructions on the implementation and data collection (Dixon, 2017). Utilizing PEAK as an intervention will take into consideration the current abilities of the learner and the deficits in behavior that the intervention will focus on.

Implementing the PEAK program to intervene on communication, social, adaptive and behavior skills is unlike any previous autism curriculum. “The methods of PEAK efficiently teach verbal skills in which meaning transfers to new stimuli without direct training” (Dixon, 2020). This factor in combination with the organization of PEAK and detailed instructions on how to implement make it a desirable curriculum to use with individuals with ASD. There are a range of programs offered by PEAK that assist with teaching language acquisition needs and other aspects of language:

- foundational learning skills (e.g. requests for what one wants, imitation, listening to instructions)
- perceptual learning skills (e.g. identifying and matching objects)
- verbal comprehension skills (e.g. answering questions)
- verbal reasoning (e.g. when told a situation, how the student would respond)
- memory (this includes pre-requisites for remembering past events)
- mathematics skills (e.g. working with quantity, numbers and money) (PEAK book reference).

In school settings, PEAK is often utilized by teachers and direct care staff who may or may not have received behavioral skills training directly related to the curriculum and are not trained directly in ABA (Dixon, Belise, Stanley, & Rowsey, 2018). This lack of training can cause the support staff to have difficulty conducting ABA based protocol within the classroom setting. In a research study conducted by Hahs and Jarynowski

(2018), the integrity of the implementation of PEAK was analyzed using a checklist to ensure that instructional delivery is consistent. During this study, staff conducted a pre-assessment with six students and identified three programs based on assessment results followed by a meeting to discuss the general purpose of PEAK. The staff implemented 10 trials of all three programs with students for a period of 10 minutes. Following this, behavioral skills training (BST) was provided as a practice session for appropriate implementation. Data collection continued for six weeks following the BST using an integrity checklist as well as the delivery of maintenance probes without any additional training. Staff members who received behavioral skills training related to PEAK showed an increase in their mean integrity score compared to their baseline score before receiving any training (Hahs & Jarynowski, 2018). This result correlated with student scores as well, where findings showed that students who received treatment from trained staff members showed an increase in their performance on targeted programs (Hahs & Jarynowski, 2018).

In this literature review, components of learning and development were discussed relative to this capstone research project. The educational learning theories, behaviorist theory and relational frame theory were discussed as the framework to the PEAK curriculum. The description, prevalence and characteristics of Autism Spectrum Disorder were reviewed to promote understanding of this disability category. Three behavior focused instructional strategies including pivotal response treatment, applied behavior analysis and PEAK were described in regard to completed research studies and current research. Lastly, PEAK was explicated to provide information that relates to the specific study which will be described in the next chapter. The following chapter will describe the

methods of this project and provide detail on the setting and participants as well as the research design and procedures for data collection.

SECTION THREE

Methods

This study investigates the implementation of PEAK Relational Training System: Direct Training Module, specifically when focused on the behavior of a second-grade student with Autism Spectrum Disorder (ASD) within a specialized learning center. I developed an instructional inquiry project using a single participant research design which will be explained in this section by describing the setting, participant, research design and procedures for data collection.

Setting

The PEAK research study was conducted in a Central Ohio, suburban elementary school within a special education classroom during the 2019-2020 school year. Within this specific school district, there are 12 elementary schools, four middle schools and three high schools consisting of 16,113 students in total. In this school district 8.8% of students are English language learners and 11% are students with disabilities. The race/ethnicities of this community with a total population of 83,138 include 72% White, 4% African American, 6% Hispanic and 15% Asian. In total, 7.9% of families live below the poverty level and 9.2% of families qualify for the Supplemental Nutrition Assistance Program (SNAP).

The elementary school identified in the study consists of grades preschool-fifth grade and includes 650 students. The demographic population of the elementary school is 62% White, 6% African American, 5% Hispanic and 23% Asian. Within the school population, 17.1% of students are identified with disabilities, 23.3% are economically disadvantaged students and 14.1% are English language learners. Each grade level

consists of four or five classrooms which have a range of 22-30 students per room. Within this elementary school, there is one special education classroom with a total of 10 students.

The special education classroom included 10 students with various cognitive disabilities including ASD, multiple disabilities, intellectual disability and some students presenting with a co-occurrence of attention deficit-hyperactivity disorder. There are eight male students and two female students in grades kindergarten through fifth grade. Students within this setting are assigned a general education classroom where they experience inclusion with their general education peers. The amount of time spent in a general education classroom varies for each individual student as a part of their least restrictive environment. All of the special education students attended related arts (physical education, art, music and library) as well as lunch and recess with their general education peers. Students received support from paraprofessionals as well as the special education teacher. This support also varied between students and could range from one on one support for the entire day to support only in the general education classroom. Students within this setting received specially designed instruction from a special education teacher in areas including literacy, math, functional academics, behavior, adaptive behavior and social skills. All of the students within this classroom received speech language therapy and occupational therapy. Nine of the 10 students received adapted physical education services and one receives physical therapy. Half of the students communicated using augmentative and alternative communication (AAC) methods used to supplement or replace speech or writing for those with impairments in the production or comprehension of spoken language.

Participant.

For the purposes of confidentiality, the name of the participant has been changed to ensure anonymity. The participant in this research, James, is an 8-year and 2-month old male student in the 2nd grade. James is a student with ASD and was given a clinical diagnosis at the age of three. He has received early intervention services since he was three to include speech therapy, occupational therapy, and physical therapy in addition to private therapies outside of school. James attended a special needs preschool program before transitioning to kindergarten. James has been a student in the special education classroom for the entirety of his school experience thus far. James's general intellectual functioning is impaired which suggests delays in this area relative to developmental expectations. James received specially designed instruction provided by the special education teacher for 200 minutes weekly in the areas of literacy, math and adaptive behavior. He also receives related services weekly in speech therapy, occupational therapy and adapted physical education. James was included within the general education classroom for portions of the day with assistance from a paraprofessional. He joined his peers for related arts as well as lunch and recess. James was also included for morning arrival and content instruction at the end of the day. James spent more than 60% of his day in the special education classroom and outside of the general education classroom due to deficits in communication, behavior, cognitive level and adaptive behavior. James' strengths in foundational skill included independence within the classroom such as independent transitions between activities, using the restroom independently, completing mastered academic tasks using structured work systems and sitting in a small group setting with minimal prompts. James' weaknesses in foundational skills included deficits

in appropriately communicating his basic wants and needs, requesting help when needed, following novel one and two step directives and initiating communication with others.

James presented with difficulties using appropriate non-verbal communication for social contact, engages in unusual behaviors such as hand flapping, unintelligible vocalizations and chewing on non-edible items. James also had difficulty relating to children and adults, providing appropriate emotional responses to people in social situations, engaged in stereotypical behaviors, had difficulty tolerating changes in routine, overreacted to sensory stimulation and presented with issues of inattention and motor or impulse control. He displayed a significant level of behavioral symptoms consistent with the diagnosis. James demonstrates continued delays in many areas of adaptive behavior development, including independence related to self-care and home use, social and leisure skills, and communication. James utilized augmentative and alternative communication through Language Acquisition through Motor Planning (LAMP) via an iPad app to communicate with peers and adults.

The selection of James as the research participant was based upon a few different factors. James presented with delays in adapted behavior development and had an adaptive behavior goal on his Individualized Education Program (IEP). Prior to the implementation of PEAK, specially designed instruction on adaptive behavior occurred daily in naturalistic settings. Through guided practice, instruction using peer and adult modeling, the breakdown of skills, repeated practice and visual support, James' adaptive behavior was addressed within the school environment. The instruction of skills including but not limited to sitting at a table, greetings and farewells, utilizing a visual schedule, waiting and taking turns was provided with guided practice when appropriate and natural

to intervene for instruction. In small group settings, James was provided the opportunity to practice these skills and benefitted from peer and adult modeling. Specific lessons or curriculum implementation was not provided in direct relation to adaptive behavior skills. The PEAK curriculum provides a streamlined approach for the selection of skills, the instruction of these skills as well as data collection. The selection of PEAK for the instruction of James' adaptive behavior skills was directly related to the organization of the curriculum and the need for a curriculum to address these skills. A single case design study was completed using a multiple-baseline-across-behaviors design with the implementation of the PEAK curriculum.

Research Design

This empirical research follows Mertens (2019) single-case design. "Single-case design (SCD) studies are a type of applied research study that are often conducted with low-incidence populations in clinical and classroom settings" (Mertens, 2019, p. 221). In this research design, an *N* of 1 is used, meaning there is only one person in the study. This type of research is based on an interest in the effectiveness of an intervention for a single, particular individual (Mertens, 2019). "Single-case design can be used to test the effectiveness of a specific instructional strategy or a therapeutic technique on behaviors" (Mertens, 2019, p. 222). The validity of single-case design can be enhanced by repeated measurements across all phases of the experiment. This goes beyond just one measurement of behavior before and after the intervention is applied. Mertens suggests that observations should be continued long enough to ensure that there is not a substantial upward or downward trend observed in the targeted behavior (2019). "Generalization of effect can be demonstrated by measurement of targeted and nontargeted responses, in

conjunction with a multiple baseline across behaviors, persons, or settings" (Mertens, 2019, p. 227).

Multiple baseline design.

The multiple baseline design involved repetition of a treatment across behaviors, people or settings followed by a comparison within a data series. For the purposes of this single-case design, a multiple-baseline-across-behaviors design was used with three chosen behaviors to target for change. In this design, a baseline was established for target behaviors followed by the implementation of an intervention for the first behavior. If the behavior was observed to change, the intervention was then applied to the second behavior and lastly, the third behavior. Added credibility was given to the effectiveness of the treatment if the child showed an increase in the second behavior following treatment (Mertens, 2019). Randomization was incorporated into multiple-baseline designs in order to statistically analyze the results. The researcher will randomly determine which behavior will be subjected to the treatment first.

Data analysis in single-case research.

This single-case design study used a multiple-baseline-across-behaviors design targeting three behaviors. Single-case research results typically use visual analysis guidelines where trends, graphed data levels and stability are reported for each participant (Mertens, 2019). Descriptive statistics are also used to summarize the results of a single-case research study. Researchers are required to use their personal judgment when using a visual display of data in graph form to decide what the experiment shows. When analyzing visual data in a single-case study, the researcher will first document a predictable baseline pattern and look at within-phase patterns. It is then determined if

there is sufficient data with consistency to demonstrate a predictable pattern. The visual analysis is then conducted to compare data from each phase "to determine if the intervention is having an effect- that is, the manipulation of the independent variable is associated with predicted change in the dependent variable" (Mertens, 2019, 237).

Procedures

The PEAK curriculum book is organized with a set of directions that clearly state how to conduct the assessment, target program selection, how to provide instruction through discrete trial training and last, recording data. In this section, I will describe the steps that were taken in these areas.

Pre-assessment.

Initially, the PEAK direct pre-assessment was completed by the special education teacher and a paraprofessional. The pre-assessment was given twice with the two different assessors. The assessment involved the systematic presentation of 64 items using the "pre-assessment script and stimuli" (Dixon, 2014). The pre-assessment was placed between the learner and the assessor and each item was presented in sequence. For each item assessed, the assessor presented 10 discrete trials that target a different question and correct response (Dixon, 2014). If James responded correctly to nine or more trials out of 10, the assessment item was marked as a "yes". A "no" was recorded if James did not meet the 90% criterion. In the instructions, it is stated that "…it is highly recommended that multiple individuals be asked to complete this assessment with the learner as results may differ based on each person's experience and rapport with the learner" (Dixon, 2014, p. 11). Both the special education teacher and the paraprofessional who administered the assessment have a good rapport with James and have known him

for an equal length of time. James's responses were recorded on the scoring guide which included two scoring options: "1" for a correct response or "0" for an incorrect response. The four sections of the assessment were added to obtain the total score out of 64. To visually organize the results of the assessment, the skills and programs in the Direct Training Module were arranged in the form of a matrix triangle by highlighting skills that James received a "yes" on during the assessment (Dixon, 2014). This matrix triangle arranges skills by complexity and facilitates the selection of target skills for acquisition. The identification of items on the assessment or matrix triangle that are not highlighted can then be matched with the corresponding program from the Direct Training Curriculum. The number of programs selected as current targets correlated with the functioning level of James and can range from 5-10 depending on if the participant is an early learning or more advanced learner.

Target program selection.

The PEAK curriculum suggests that "early learners, who require frequent reinforcement and who have mastered few skills, may be more successful with fewer active programs. For these early learners, we recommend no more than 5 programs be run" (Dixon, 2014, p. 13). Three programs were selected as targets from the performance matrix triangle out of the 44 identified items through organization in a pyramid matrix as referenced in Appendix 1. The three programs chosen were, 6B: Greetings/Farewells-; 6G: Tact 2-3-word phrases; and 6A: Vocal imitation. These foundational skill programs were chosen from nine out of 16 programs that James did not pass in the pre-assessment. These three programs align most closely to his IEP goals as well. Each program has an accompanying program instruction sheet to include the goal, materials needed,

instructions for caregivers and typical stimuli for the program (Appendix 2-4). Randomization was incorporated in the selection of which program to target first. In this study, the intervention first targeted 6A- Vocal imitation, then 6B- Greetings and Farewells and last, 6G- Tact 2-3-word phrases. Baseline was established for all three behaviors before the intervention was implemented using the pre-assessment results. Below is a description of the three targeted programs.

Greetings and Farewells- 6B

Goal: When presented with a greeting or farewell from another person, the participant will respond appropriately.

Instructions for Caregivers: When another person enters the room, have that person greet the participant (or when another person leaves the room, have that person say good-bye to the participant).

Stimuli: “Hello”, “Bye”

Tact 2-3-word phrases- 6G

Goal: When presented with a 2-3-word phrase, the participant will imitate it.

Instructions for Caregivers: Say a 2-3-word phrase and have the participant repeat it.

Stimuli: “I want help”, “more please”, “no thank you”, “all done”

Vocal Imitation- 5A

Goal: When given a single letter sound, the participant will imitate it.

Instructions for Caregivers: Say, “Do this,” and make a single letter sound.

Stimuli: A, C, T, D, R, P, M, L, S, Z

Instruction through discrete-trial training.

PEAK instruction was provided to James targeting each behavior during three sessions per day for five days (15 sessions a week); for a total of 45 PEAK sessions over the duration of three weeks. Each session consisted of 10 trials and lasted approximately five minutes. Instruction was provided in the special education classroom with one-to-one instruction from a special education teacher. Reinforcement was used for correct responses in the form of edibles (goldfish) which was paired with verbal praise. The first program, vocal imitation, was the initial intervention which was randomly chosen in the multiple baseline data collection. This program was implemented over the course of five days in the second and third week of February. The second program, greetings and farewells, was implemented in the fourth week of February. The third program, tact 2-3-word phrases was implemented in the first week of March.

The intervention was provided through discrete trial training (DTT) where questions were broken down into clearly defined units followed by specific feedback. For example, verbal directions were provided such as “Do this, /d/” or “Do this, more please”. Reinforcement was also used to increase the likelihood of the occurrence of a specific behavior. Each program was presented in 10 trials. Each trial started with the preparation of stimuli (SD) and establishing motivation, in this instance, a goldfish snack. The stimuli were presented followed by three seconds of wait time to allow James to respond. If James presented a correct response, it was followed by social praise and the tangible reinforcer of goldfish. If James responded incorrectly, the SD was represented again followed by a prompt and the three second wait time. This process continued for 10 trials and earned James a score at the end of the 10 trials. James received prompts each

trial until he responded correctly before moving on to another SD. The correct responses in the three targeted programs were vocal responses by James using his augmentative and alternative communication (AAC) device. This repeated for the entirety of 10 trials across the 15 sessions of each program. Prompting was an important part of this sequence as a method to produce an appropriate response when the SD is unlikely to produce it alone. Prompts included hand-over-hand guidance using the AAC device by taking James' hand and guiding to the correct response. Prompts also included vocal cues and gestural cues of pointing to his AAC device to help James present a particular response. The prompt hierarchy refers to the level of instruction that is given when asking a student to complete a task and orders the level of prompting based on how intrusive the level of instruction is. Prompts given were systematically increased or faded depending on the responses from James. Initially, James was given the SD and three-second wait time. If he responded incorrectly, James was provided a verbal prompt, which is typically a repetition of the SD. If followed by another incorrect response, James would be provided a gestural prompt such as pointing to his AAC device. If an incorrect response is received, a hand-over-hand prompt to the specific word on his AAC device was provided. In some instances, it was necessary to provide a more intrusive prompt to model the correct response when initially beginning a program, such as hand-over-hand guidance, before moving to a vocal or visual clue.

Method for data collection.

Baseline was collected during the pre-assessment trial where it was observed that James was unable to complete these tasks on the assessment. Out of the selected programs, it was randomly decided which intervention would be implemented first,

second and third using the multiple-baseline-across-behaviors design. Once implementation began, performance data for each program was collected and assessed using data collection sheets (Appendix 5). The PEAK system provided data sheets within the curriculum that included tables representing 10 discrete trial training blocks. These trial tables were used to record the order of presented stimuli and response score for each trial. Stimulus numbers were randomly assigned to each trial within a block prior to beginning a trial block. The numbers correspond to the stimulus number on the program sheet and were randomized to deter from teaching stimuli in the same order resulting in rote memorization. The response score options corresponded with the number of prompts given in a trial. If James responded independently, he earned a 10. If he required one additional prompt, he received eight points, two prompts earned four points, multiple prompts or reduced stimulus array earned two points and no response earned zero points. The total response scores were added up for the entire block, out of 100 points. These scores were used to summarize James' performance and determine mastery criteria for the skill targeted by the program. The special education teacher considered James's abilities to determine his mastery criteria of earning at least 90 points for three consecutive trial blocks before adding new stimuli. The determination of mastery criteria considered the level of prompt required, the consistency of responding and frequency of sessions. When James was able to consistently give independent responses and received a 90% score over three sessions, the stimuli was indicated as mastered. As James participated in the programs and trials, stimuli mastery was determined on a trial by trial basis as he was able to show independence quickly depending on the specific program.

Once James earned a score of 90 in three consecutive trial blocks, new stimuli was added. This entire process was the same for each of the three areas that were assessed.

Researcher journal.

Throughout the entirety of the intervention, daily entries into a researcher journal were completed by the special education teacher. For each day, one journal entry was completed on a Google document. The journal entries were unstructured and allowed for a short free-write of ideas after administering the intervention. The content typically reflected the ease or difficulty of the session, the student's response to the intervention as well as the addition of this instructional time into the daily schedule. This process remained the same for the entire intervention and each journal entry was completed at the end of the school day.

Data Analysis.

After collecting all of the data, I used spreadsheets to graph the numerical data to show change over time. The graphs include data from the individual sessions completed throughout the duration of the three-week study. Graphs are also included to show the daily average of the three sessions per day to show change over time. I created a table with the pre- and post-assessment data to compare the scores and measure the inter-rater reliability between both staff members administration of the assessments. The researcher journal was analyzed to discover any recurring themes within daily entries throughout the study to complete a thematic analysis. Key words and word repetitions were coded, and the data was recorded in a spreadsheet. Themes were then generated, reviewed and named.

SECTION FOUR

Results and Analysis

The data and results of the pre-assessment, post-assessment, targeted programs and researcher journal make up the extent of this section. This section is structured around the two research questions which guided the work of this project:

1. What is the relationship between implementing PEAK Relational Training System and the foundational skills of a second-grade student with Autism Spectrum Disorder?
2. How can PEAK Relational Training System be implemented in a specialized learning center?

This section examines the implementation of PEAK Relational Training System when targeting the foundational skills of a second-grade student with Autism Spectrum Disorder.

Relationship of PEAK and Foundational Skills Acquisition

After scoring the pre-assessments and post-assessments administered by the special education teacher and paraprofessional using the assessor script and scoring guide (Appendix 6-9), I calculated the total scores. Table 1 indicates the results of the scores for the pre- and post-assessments administered by both staff members.

Table 1

Scores from the PEAK Direct Training Module pre-assessment by staff member

Staff Member	Foundational Learning	Perceptual Learning	Verbal Comprehension	Verbal Reasoning, Memory, and Math	Total score
Teacher	11	11	2	0	24/64
Paraprofessional	11	11	2	0	24/64

Table 2

Scores from the PEAK Direct Training Module post assessment by staff member

Staff Member	Foundational Learning	Perceptual Learning	Verbal Comprehension	Verbal Reasoning, Memory, and Math	Total score
Teacher	17	10	1	1	29/64
Paraprofessional	17	10	2	0	29/64

Inter-rater reliability scores show that the assessors agreed on 5/5 scores for the pre-assessment and 3/5 scores for the post-assessment. Both assessors utilized the same materials for the assessment. I also conducted a calculation of learning gains to assess student learning using the total scores from the pre and post assessment administered by

the special education teacher. The normalized learning gain score of 12.5% was calculated using the following formula:

nlg = (learning gains) (possible learning gains) = (post - pre) (100% - pre)

12.5%= (5)(40) = (post - pre) (100% - pre)

The following tables present qualitative data from individual sessions of targeted programs as well as the daily averages of each program with the score that James received each session. These scores are indicative of the number of prompts needed for each trial. Each trial has a maximum score of 10 points if the participant is given zero prompts. Scores decrease as prompt levels increase moving to eight if the student required one prompt, four points if the student required two prompts, two points if the student required 3 or more prompts and zero points if the student did not provide a response. After completing 10 trials, the score is added up and converted to a percentage out of the total 100 points for the session. The following figures display each session score throughout the intervention implementation as well as the daily average from the three sessions per day.

Figure 1

Individual session scores of targeted program 5A

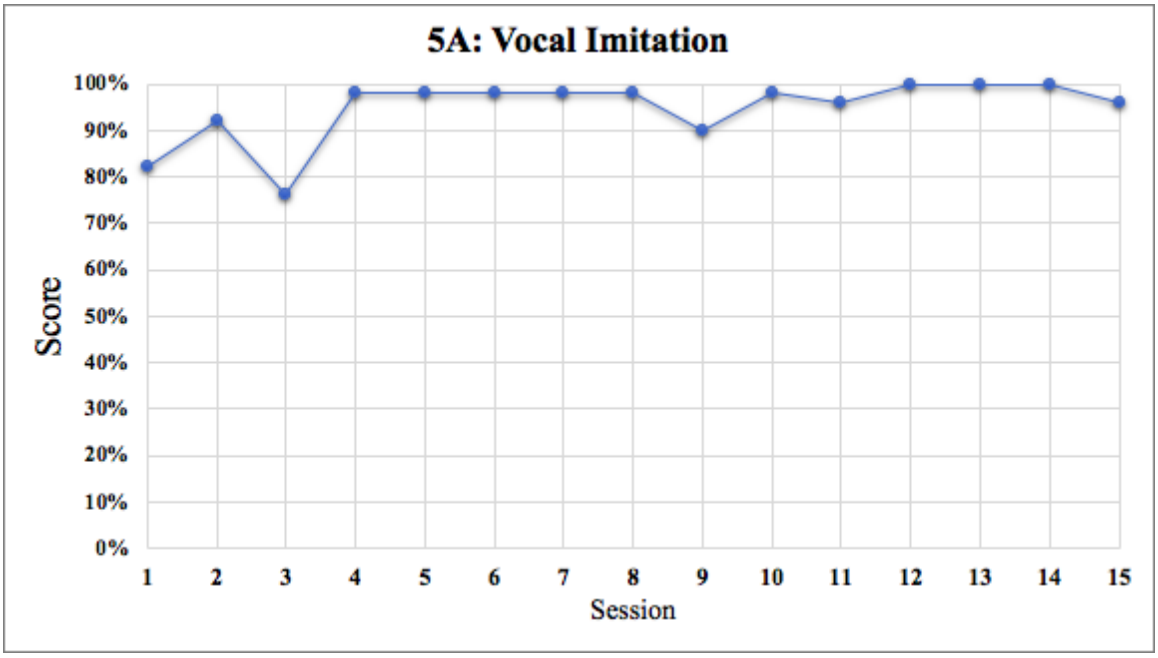


Figure 2

Daily average scores of targeted program 5A

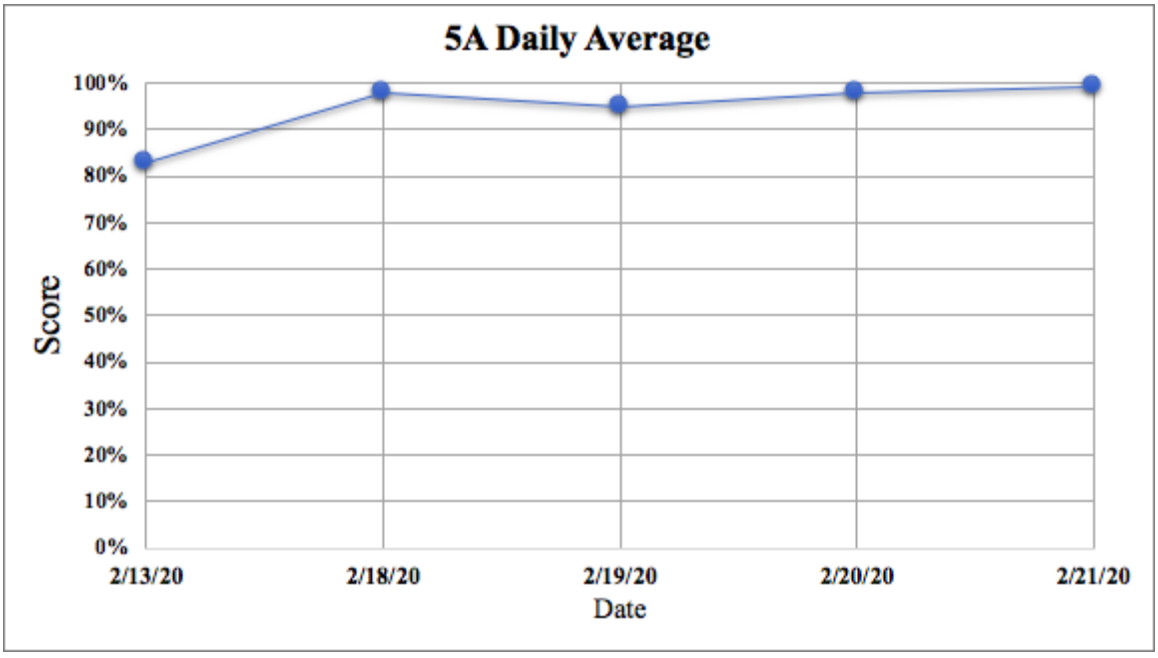


Figure 3

Individual session scores of targeted program 6B

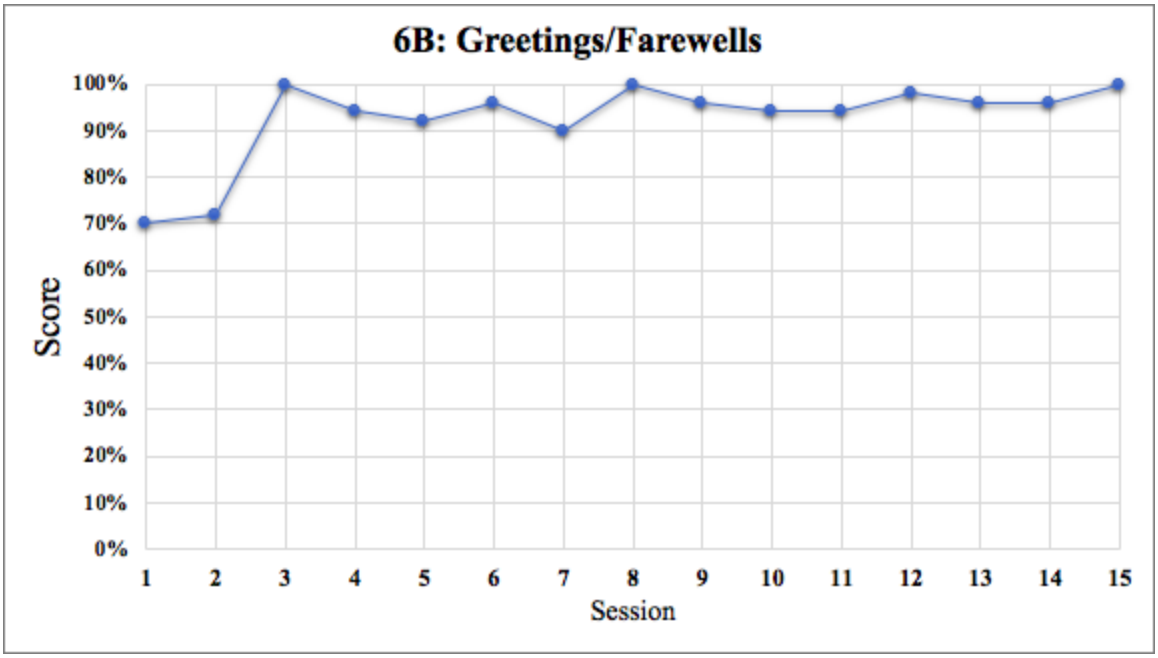


Figure 4

Daily average scores of targeted program 6B

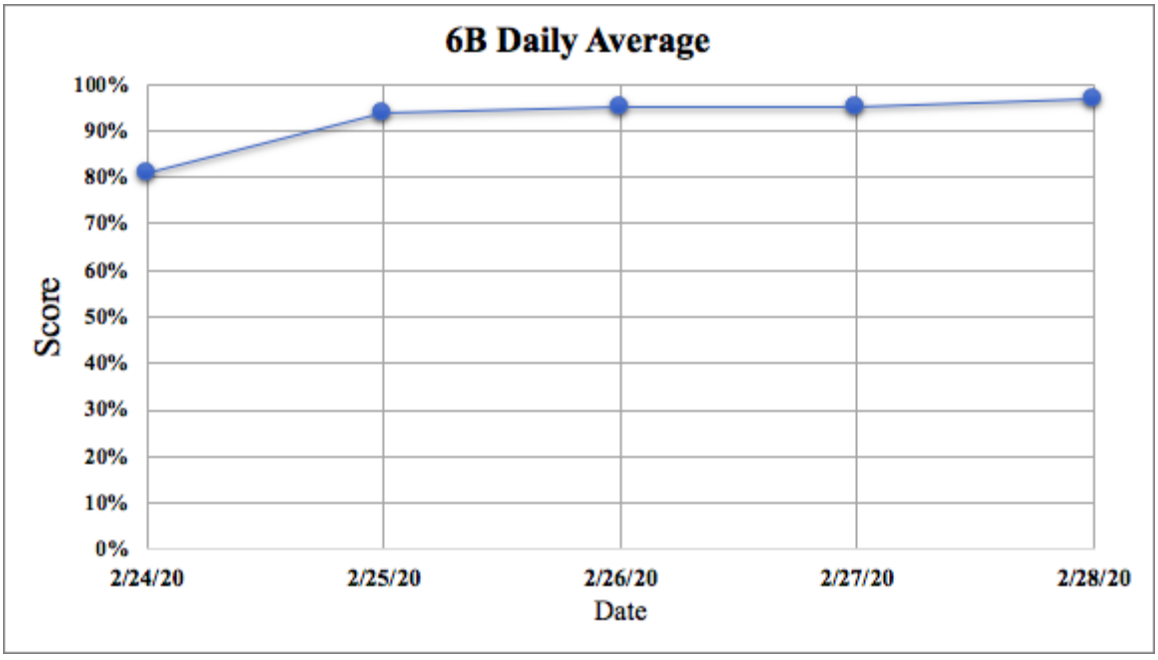


Figure 5

Individual session scores of targeted program 6G

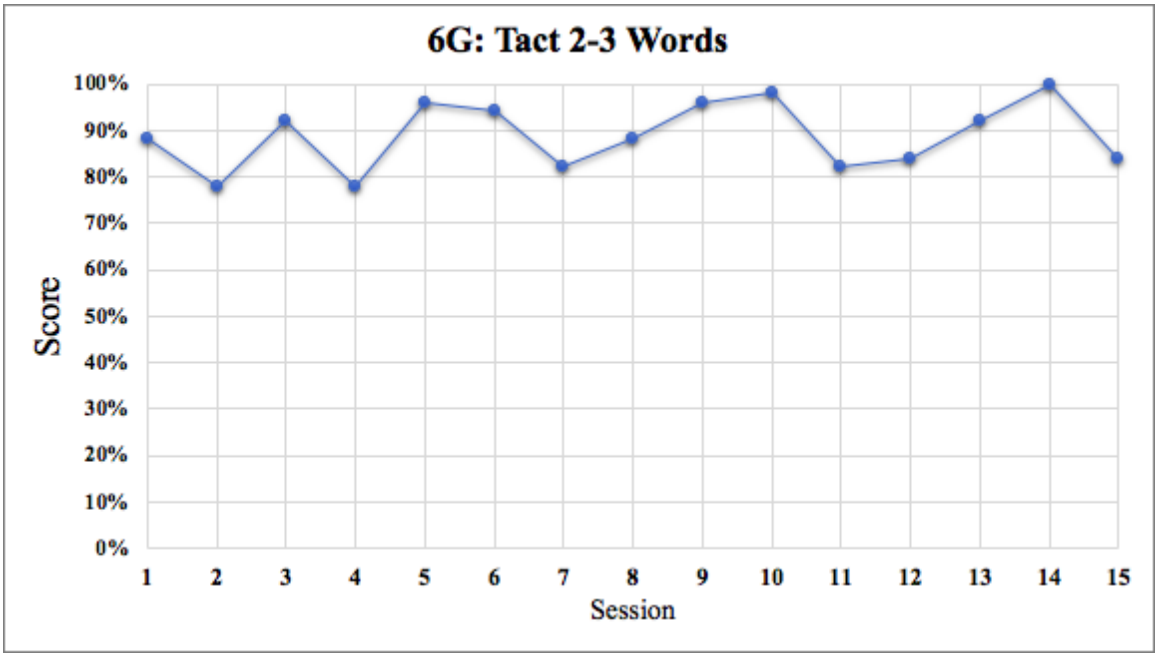
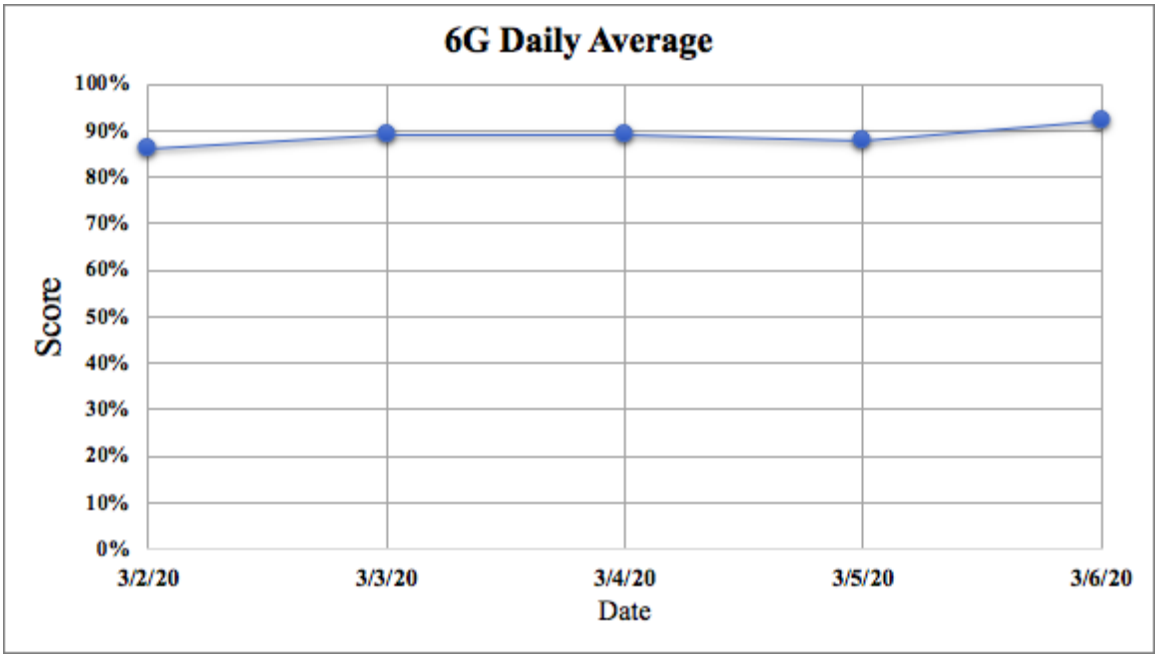


Figure 6

Daily average scores of targeted program 6G



Thematic Analysis of the Researcher Journal.

Through daily journal entries by the researcher, qualitative data from each session were collected and analyzed using thematic analysis. Five main themes emerged from this analysis. The most common theme that occurred within the researcher journals was the presence of behavior. As explained in the literature review, specific criteria within the DSM-5 (American Psychiatric Association, 2013) for the diagnosis of ASD include persistent deficits in social communication and social interaction across multiple contexts and restricted, repetitive patterns of behavior and interests. For example, when completing the intervention with James, I am able to see his reactions to show either a preference or an aversion by noticing his behavioral response. The presence of behavior theme included all codes mentioning the word behavior or phrases where behavior is described. On February 20th, an entry in the researcher journal recounted that James exhibited verbal refusal by saying “no” and whining during the program. On February 26th, the researcher journal recording described that James exhibited some behaviors such as putting his head down, crying and yelling. On the other hand, James exhibited the behaviors of self-correction, holding eye contact and giggling on various other occasions recorded in the researcher journal. The pattern exhibited in the researcher journal presented more positive behaviors than negative behaviors throughout the sessions with James. For example, on the first session, February 13, 2020, it was recorded that James exhibited immediate compliance with the program. On another date, February 20, 2020 the journal stated that James is compliant to the intervention as long as he is being consistently reinforced. By March 3, 2020, James used verbal utterances as well as his speech generating device in response to the stimuli.

Implementation of PEAK in a Specialized Learning Center

The other themes related to the second research question focusing on how PEAK Relational Training System can be implemented in a specialized learning center. These themes were the presence of behavior, use of reinforcement, schedule changes, data collection and frequency of prompting. The presence of behavior theme included all codes mentioning the word behavior or phrases where behavior is described. The use of the reinforcement theme included codes where reinforcement is mentioned, reinforcers are added or changed and details regarding the specific type of reinforcement is discussed. For example, on February 26, 2020 James worked for goldfish as a reinforcer and was extremely motivated by this method of reinforcement. On February 25, 2020 James was reinforced by fruit snacks but was not as motivated by this reinforcer. Codes within the data collection theme included details regarding the methods of data collection, ease of data collection and ability to analyze the data during and after sessions. Specifics regarding the structure of the schedule or any changes to the schedule were included within the schedule changes and structure theme where mention of rearranging the schedule or organizing the sessions within the school day make up most of this coded information. The changes to the classroom schedule related to the effect of the PEAK implementation in the special education classroom. There were changes made to the direct instruction schedule in order to set aside time to complete individualized instruction with James in addition to the existing instruction needed with other students. Making changes to the schedule for students with ASD can create disruptions in behavior as the nature of their disability includes symptoms of repetitive nature and students benefit from structure throughout the day. By using the structured curriculum of PEAK

with James, it allowed for predictability in his routine and I observed his behavior to improve throughout the duration of the study. There are many interventions that I use with students that can result in behavior changes. I have noticed that over the last two years of working with James, his response to interventions vary but typically include the presence of negative behavior such as refusal, crying or yelling. When implementing PEAK for the 15-day duration of the study, I observed changes in his behavior. At the beginning of the intervention, James' exhibited more negative behaviors but as the session frequency increased, positive behaviors increased as well. His response to the structure was much more positive than other interventions I have used in the past. Like previously mentioned, schedule changes impact the behavior of students with autism spectrum disorder so in order to make the necessary changes to implement PEAK, revisions to individual student schedules were made. Visual activity schedules were used in this setting as research shows that they have been used to reduce problem behaviors (Lequia et al. 2012; Massey and Wheeler 2000), decrease latency to begin a new activity (Dettmer et al. 2000), and to decrease tantrums during transitions (Knight, Sartini, Spriggs, 2014). From a journal entry on February 25th, I described the schedule changes as a challenge due to the individual nature of PEAK. The addition of PEAK changed my schedule from the typically used method of small group instruction to one-on-one time with James throughout the day. The researcher journal stated that on February 27th, James did not seem compliant to work at a different time due to a change in schedule since he arrived late to school. It also described that the only way to make up instructional time with other students would be by extending a work session or if a student is absent. On February 24, 2020 the journal entry included that James would

transition to the group table to complete a session in a one-to-one setting which took about 4 minutes.

Lastly, within the frequency and utilization of prompts theme, any mention of prompting, the prompting hierarchy or accounts of utilizing prompts to elicit responses were included. In the researcher journals on February 18th and 24th both described the prompting levels as beginning with gestural prompts then moving to verbal prompts. There were only two recordings in the researcher journal of James needing hand-over-hand prompting. A journal entry from February 19, 2020 explained that by the third session of the day, James needed more prompting to complete the session. On the other hand, by March 3, 2020, James began waiting for the prompt and then giving the correct response immediately. The frequency of prompting was recorded and analyzed when recorded in the researcher journal. Both qualitative and quantitative data were analyzed and interpreted throughout this section. Any findings and discussion regarding the analysis are included in the next section of this capstone project.

SECTION FIVE

Discussion and Conclusion

The aim of this study was to investigate the implementation of the PEAK (Promoting the Emergence of Advanced Knowledge) Relational Training System: Direct Training Module (Dixon, 2014), specifically when focused on the behavior of a second-grade student with ASD within a specialized learning center. The purpose of the present study was to assess the relationship of PEAK implementation and the foundational skills of a 2nd grade student with ASD. The secondary focus was the uncovering of implementing PEAK Relational Training System within an SLC. The research questions that guided this study are listed below.

1. What is the relationship between implementing PEAK Relational Training System and the foundational skills of a second-grade student with Autism Spectrum Disorder?
2. How can the PEAK Relational Training System be implemented in a specialized learning center?

This study examined the implementation of PEAK Relational Training System within a specialized learning system over the course of 15 days. The targeted programs focused on the foundational skills section of the curriculum and were implemented with a second-grade student with Autism Spectrum Disorder. The special education teacher took many variables into consideration when adding this intervention to the group of instructional strategies used within the classroom. There were adjustments made to the schedule as well as to the structure of groups throughout the day to create time for individual time with James. Refer to tables 1 and 2 for findings from the quantitative

analysis completed that show an increased normalized learning gain from the pre-assessment to the post-assessment. The participant received a higher score on the post-assessment which shows a learning gain in foundational skills after implementing the intervention. Since there was one participant in this study, we cannot speak to the significant change in score for this participant. However, speaking practically, based on what was observed and recorded in the data and researcher journal, the targeted area of foundational skills increased six points which is determined to be observably significant for the participant. The special education teacher has worked with James for the last two years and has been able to observe his behavior throughout this time period. It was observed that during the 15-day intervention period, James behavior changed significantly. The change in behavior and compliance towards the program was observed to be significant in that there was an increase in the frequency of compliant behaviors over the course of the intervention. Compliant behaviors that were observed included eye contact, laughing, initiating responses and accurate responses. These changes have not been observed to occur in this short of a time period when implementing other interventions over the course of the two years that James has been a student in the SLC. The data analyzed in the daily average figures show that there is an increase in score over time when implementing the targeted PEAK programs. This suggests that the implementation of PEAK had a positive effect on the participants' overall assessment score. This included a rise in the score section for foundational learning skills. This is a significant observation due to the fact that this curriculum is the only currently available curriculum in the school district that focuses on teaching foundational skills through discrete trial training. This method of instruction can be beneficial for students with

autism spectrum disorder because it provides a predictable and structured approach to acquiring new skills. Children with ASD exhibit challenges in the area of adaptive functioning (Di Rezze, Duku, Szatmari, Volden, Georgiades, Zwaigenbaum, ...Waddell, 2019) which is synonymous for foundational skills. Adaptive functioning is described as practical skills related to communication, daily living skills (DLS) and socialization (Di Rezze et al., 2019). The area of adaptive behavior also includes the ability to use language to make needs known, learn functional academic activities, relate to others and function independently (Milne, McDonald, & Comino, 2012). Deficits in this area of skills affects social skill acquisition and presentation later in life (Ventola, Saulnier, Steinber, Chawarska, & Klin 2011). The focus on foundational skills or adaptive behavior for this study was chosen precisely to bridge that gap of instruction that most curriculums lack as well as to introduce a strategy that utilizes a structured approach for students with ASD. Figure 1 shows an increase in score with a spike on the fourth day of implementation. This indicates that after multiple days of intervention, the participant improved his response accuracy due to the consistent discrete trial technique of instruction. Figure 3 shows a similar increase with a spike on the third day of implementation. James did not receive any other instruction for foundational learning skills during this time. This indicates that as multiple programs are targeted, the increase in score continued to occur when using this intervention.

Findings from the thematic analysis of the researcher journal propose that language regarding the participant's behavior was most often reflected upon after each session. For the context of this study, behavior will be described as the participants' reaction to the implementation of the intervention by the special education teacher. This

included positive reactions such as earlier described behaviors giggling and laughing. Alternatively, it could include negative reactions such as refusal to complete tasks, inappropriate verbalizations and crying. For example, on February 26th, it was recorded that during instruction James continued putting his head down, crying and yelling. This indicated that James was not engaged in the program at this time and had an aversive experience that caused him to react in a negative way. As described, James exhibits deficits in communication and often communicates with unusual verbal utterances or behavioral reactions such as yelling or crying. These skill deficits also align with those outlined in the DSM-5 including the impaired nonverbal communication- body language, facial expression, gestures, eye contact, and the alignment of language and nonverbal behaviors (Turnbull et al, 2020). In the journal entry for March 2, 2020, James made direct eye contact as I delivered the initial prompt and self-corrected his error. On March 4, 2020, James began to giggle and laugh when he responded correctly. Through the daily journal entries, there were many different behaviors described throughout the study but as the intervention continued, negative behaviors were mentioned less, and positive behaviors began to emerge. This suggests that as the intervention continued, James' reactions to the program were more positive than at the start.

This information and data analysis suggest that the participants' reaction and behavioral response to the intervention is a large piece when implementing instructional strategies with students who have moderate to severe disabilities. The presence of these behaviors is directly related with the information regarding scheduling, data collection, prompting and reinforcement as these themes play a major role in the implementation of interventions within a specialized learning center. This conveys the importance of

multiple key factors when implementing a new curriculum in a self-contained special education classroom. Intensive support needs are required when serving students who have multiple disabilities, autism spectrum disorder or intellectual disability (Turnbull et al, 2020). Individualized and oftentimes, one on one instruction, may benefit the student because it is geared towards their ability and cognitive levels and includes accommodations and modifications that may benefit the specific student. Different accommodations, such as repetition of questions, prompts to stay on task, frequent reinforcement and scheduled sensory breaks are often provided during instruction. Providing this specialized instruction requires the knowledge of modified or extended academic content standards, interventions, and behavior management techniques. Creating an environment conducive to learning, specifying goals, identifying current reinforcers and collecting useful data are key factors to promoting positive change using ABA. In a recent study evaluating the efficacy of PEAK Relational Training System, McKeel, Dixon, Daar, Rowsey and Szekely found that "smaller levels of applied behavior analysis-based interventions are promising given that such levels are more practical in typical educational settings" (p. 241, 2015). Implementing the smaller level of ABA within the specialized learning center through this study is reflective of the necessary environment and techniques that benefit learners with significant cognitive disabilities.

Limitations.

There are several possible limitations that could have impacted the results of this study, including the duration of the intervention and participant sample size. The first limitation, duration of the intervention, influenced the amount of data that was collected

throughout the study. The duration was 15 days with three sessions per day. This only allowed for 45 data collection points for all three targeted programs. Programs were targeted for only five days at a time which does not allow for regression or recoupment data collection upon returning from weekends or days off from school. For example, the PEAK-DT instructions (Dixon et al. 2014c) recommend the reevaluation of learner skills via the PDA every 3 to 6 months, rather than the 15-day period of this study (Mckeel, Dixon, Daar, Rowsey, & Szekely, p 240, 2015).

Another possible limitation of this study is the participant size of one student. This curriculum is designed for one-to-one instruction with individual students as is common with single case studies in the field of special education. During this study, it was not possible to complete this instruction with multiple students due to instruction legally required to remain compliant with student Individualized Education Programs. According to Gall, Gall, and Borg (2015), the recommended sample size in order to find a statistically significant relationship or difference is 21 participants per group to one-tailed testing. Due to this, I was unable to determine any change as significant from this study.

Future research.

Through my implementation of PEAK Relational Training System, it was discovered that this curriculum could be beneficial to utilize this intervention with more students within the SLC setting. Since the programs in PEAK cover so much material, it may be interesting to try and find programs that match student specific IEP goals as a method of direct instruction for students. Alternatively, creating IEP goals based on PEAK programs could be explored. Additionally, I would continue to administer the pre-

and post-assessment as suggested by the author to collect data on effectiveness of this intervention with individual students. In future research studies on PEAK Relational Training System, it may be beneficial to consider the researcher as a full-time special education teacher and how the implementation affects the daily routine and structure in place. Another implication of future research would involve the re-evaluation of the participant every 3-6 months as described in the program instructions.

As a result of this study, future research studies should increase the sample size and include a control and experimental group when looking at the effectiveness of implementation in a special education classroom. Future research studies should also increase the duration of the study if conducting a single-subject study. This will allow the researcher to collect more data to determine change over time and the significance of the intervention on the acquisition of a skill set. Multiple assessments could be completed over time to address other variables such as regression, recoupment and maintenance of skills.

Conclusion.

In the end, I learned that the implementation of PEAK Relational Training System did have an impact on the participants' foundational learning skills. I also learned that the other factors such as reinforcement, prompting, behavior and data collection are easily tied into the implementation since the curriculum is comprehensive, so it is important to consider the amount of outside work needed when adding a new curriculum to instruction. This study influenced my ability to reflect on my instruction and create new ideas for implementing this curriculum with more than one student. The reflections made after implementing PEAK allowed me to examine how I am prompting, delivering

intervention and allowed me to dissect the response from James. In the future, I could work with a small group of two or three students and rotate which student receives the intervention. This intervention does work best when providing instruction to one student at a time in order to collect accurate data and execute prompting effectively for each student. This study also supported James in learning to increase his communication skills as well as complete learning activities that were conducive to his individual method of learning. It is important to consider that this specific curriculum is unique in the educational setting. Typically, ABA programs are offered through center-based or home-based programs and offer individualized attention through a discrete trial approach. There are other interventions available that may be successful for students with ASD, but PEAK Relational Training System is a curriculum that is meant to be used in an educational setting and allows for implementation without having to be an ABA provider. The organized and detailed directions allow for a special education teacher to then teach special education paraprofessionals the structure of the intervention for delivery with students. It also includes the pre and post assessments that are needed when determining the deficits that a student may have and also includes the programs to address those deficits. This is a valuable curriculum for teachers to use because it provides an efficient way to bring ABA strategies into the classroom setting. PEAK would be desirable to use in a special education setting because it offers all of the components, including assessment, data collection and procedures for implementation, in an easy to read format that also shares some of the research behind the curriculum. Like previously stated, there are numerous instructional strategies available that are focused towards individuals with disabilities but in my experience, the ease and efficiency of implementation in

combination with the observable changes that I saw in my student provides me with the confidence that I could continue to use this as my main instructional strategy.

I plan to share this information with my colleagues, so they can better understand the effectiveness of this curriculum and the ability to integrate it into their instruction. I will also share my methods for implementation with my colleagues since we are not yet provided training for the implementation of this specific curriculum. Lastly, I will share this information with James' parents so that they can see the effect of this specific program and the intervention style that caters to James' specific needs and skills.

LIST OF REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Barnes-Holmes, D., & Barnes-Holmes, Y. (2000). Relational frame theory and Skinner's verbal behavior: A possible synthesis. *The Behavior Analyst, 23*, 69-84.

Balboni, G., Tasso, A., Muratori, F., & Cubelli, R. (2016). The Vineland II in preschool children with autism spectrum disorders: An item content category analysis. *Journal of Autism and Developmental Disorders, 46,* 2-52. doi: 10.1007/s10803-015-2533-3

Bilaver, L. A., Cushing, L. S., & Cutler, A. T. (2016). Prevalence and correlates of educational intervention utilization among children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 46*, 561-571. doi: 10.1007/s10803-015-2598-z

Christensen, D.L., Van Naarden Braun, K., Baio, J., Bilder, D., Charles, J. Constantino, J. N., …Yeargin-Allsopp, M. (2018). Prevalence and characteristics of autism spectrum disorder among children aged 8 years. *Autism and Developmental Disabilities Monitoring Network, 65,* 1-20. doi: 10.15585/mmwr.ss6513a1

Di Rezze, B., Duku, E., Szatmari, P., Volden, J., Georgiades, S., Zwaigenbaum, L., ...Waddell, C. (2019). Examining trajectories of daily living skills over the

preschool years for children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 49,* 4390-4399. doi: 10.1007/s10803-019-04150-6

Dixon, M. R. (2014). *Promoting the emergence of advanced knowledge relational training system: Direct training module.* Carbondale, IL: Shawnee Scientific Press LLC.

Dixon, M. R. (2015*) PEAK relational training system: Equivalence Module*. Carbondale, IL: Shawnee Scientific Press LLC.

Dixon, M. R., Belisle, J., McKeel, A., Whiting, S., Speelman, R., Daar, J. H., & Rowsey, K. (2017). An internal and critical review of the PEAK relational training system for children with autism and related intellectual disabilities: 2014-2017. *The Behavior Analyst, 40*(2): 493–521. doi: 10.1007/s40614-017-0119-4

Dixon, M. R., Belisle, J., Stanley, C. R., & Rowsey, K. (2018). Student outcomes after 1 year of front-line staff implementation of the PEAK curriculum. *Behavior Analysis and Therapy, 33,* 185-195. doi: 10.1002/bin.1516

Mayer, G. R., Sulzer-Azaroff, B., Wallace, M. (2018). *Behavior Analysis for Lasting Change, (4th ed.)*. Hudson, NY: Sloan Publishing

Gall, M. D., Gall, J. P., & Borg, W. R., (2007). *Educational Research: An Introduction, (8th ed.).* New York, NY: Pearson Education.

Hahs, A. D., & Jarynowski, J. (2018). Targeting staff treatment integrity of the PEAK Relational Training System using behavioral skills training. *Association for Behavior Analysis International, 12,* 209-215. https://doi.org/10.1007/s40617-018-00278-6

Hayes, S. C., & Wilson, K. G. (1996). Criticisms of relational frame theory: Implications for a behavior analytic account of derived. *Psychological Record, 46*(2), 221-236.

Jobin, A. (2020). Varied treatment response in young children with autism: A relative comparison of structured and naturalistic behavioral approaches. *Autism, 24*(2) 338–351. doi: 10.1177/1362361319859726

Knight, V., Sartini, E., & Spriggs, A. D., (2014). Evaluating visual activity schedules as evidence-based practice for individuals with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders, 45,* 157–178. doi: 10.1007/s10803-014-2201-z

Mayo, J., Chlebowski, C., Fein, D., & Eigsti, I. M. (2013). Age of first words predicts cognitive ability and adaptive skills in children with ASD. *Journal of Autism and Developmental Disorders, 43,* 253-264. doi: 10.1007/s10803-012-1558-0

McKeel, A. N., Dixon, M. R., Daar, J. H., Rowsey, K. E., & Szekely, S., (2015). Evaluating the efficacy of the PEAK relational training system using a randomized controlled trial of children with Autism. *Journal of Behavioral Education, 24,* 230-241. doi: 10.1007/s10864-015-9219-y

Mertens, D. M. (2019). *Research and Evaluation in Education and Psychology: Integrating Diversity with Quantitative, Qualitative, and Mixed Methods. (5th ed.).* New York, NY: SAGE Publishing

Milne, S. L., McDonald, J. L., & Comino, E. J. (2012). Adaptive function in preschoolers relate to developmental delay and diagnosis of autism spectrum disorders:

Insights from a clinical sample. *Autism, 17*(6), 743-753. doi: 10.1177/1362361312453091

Mohammadzaheri, F., Koegel, L. K., Rezaee, M., & Rafiee, S. M. (2014). A randomized clinical trial comparison between Pivotal Response Treatment (PRT) and Structured Applied Behavior Analysis (ABA) intervention for children with Autism. *Journal of Autism and Developmental Disorders, 44,* 2269-2777. doi: 10.1007/s10803-014-2137-3

Reed, D. D., & Luiselli, J. K. (2016). Promoting the emergence of advanced knowledge: A review of PEAK relational training system: Direct training module by Mark R. Dixon. *Journal of Applied Behavior Analysis, 49,* 205-211. doi: 10.1002/jaba.281

Rice, C. E., Rosanoff, M., Dawson, G., Durkin, M. S., Croen, L. A., Singer, A., Yeargin-Allsopp, M. (2012). Evaluating changes in the prevalence of the autism spectrum disorders (ASDs). *Public Health Review, 34,* 1-22. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4520794/pdf/nihms710274.pdf

Rosenberg, R. E., Daniels, A. M., Law, J. K., Law, P. A., & Kaufmann, W. E. (2009). Trends in autism spectrum disorders. *Journal of Autism and Developmental Disorders, 39,* 1099-1111. doi: 10.1007/s108083-009-0723-6

Sheldrick, R. C., & Carter, A. S. (2018). State-level trends in the prevalence of autism spectrum disorder (ASD) from 2000-2012: A reanalysis of findings from the autism and developmental disabilities network. *Journal of Autism and Developmental Disorders, 48,* 3086-3092. doi: 10.1007/s10803-018-3568-z

Strauss, S. (2000). Theories of cognitive development and learning and their implications for curriculum development and teaching. In B. Moon, M. Ben-Peretz, & S.

Brown (Eds.), *Routledge international companion to education* (p. 28-50). London: Routledge.

Turnbull, A., Turnbull, R., Wehmeyer, M. L., Shogren, K. A. (2020). Exceptional lives: Practice, progress, & dignity in today's schools (9th Edition). Pearson.

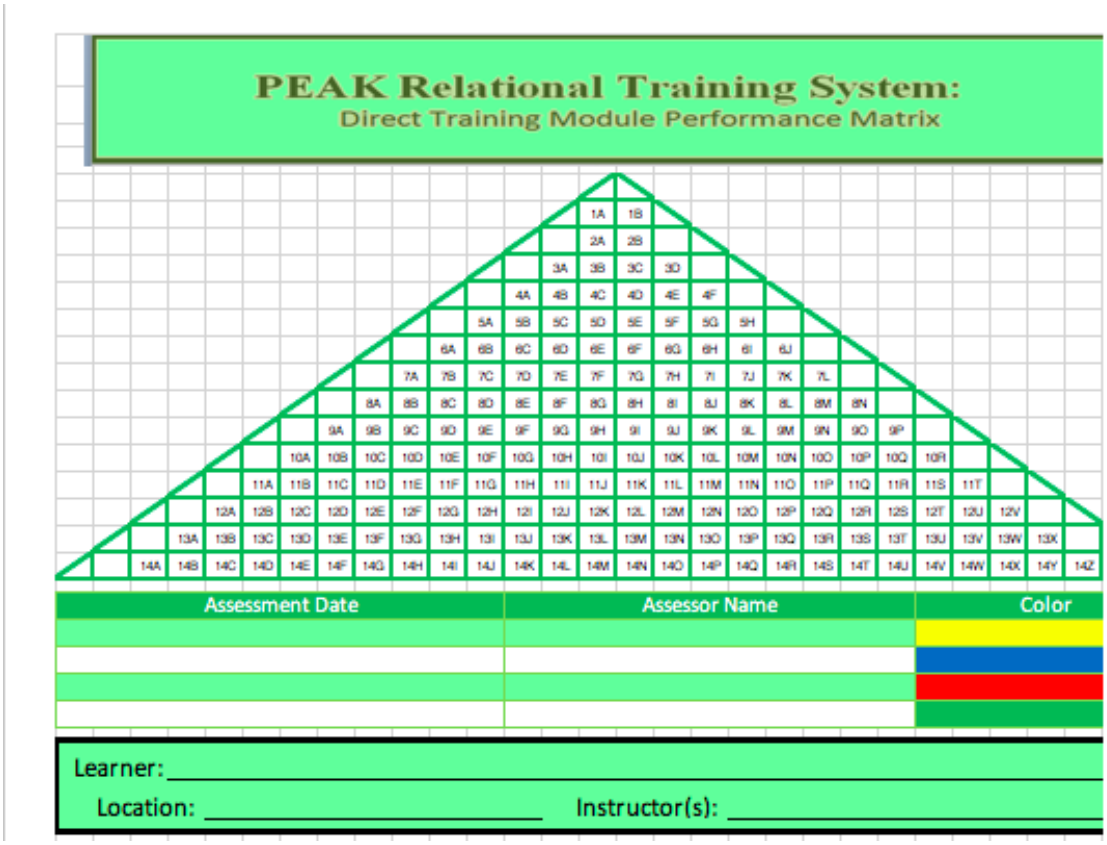
Ventola, P., Saulnier, C. A., Steinber, E., Chawarska, K., & Klin, A. (2014). Early-emerging social adaptive skills in toddlers with autism spectrum disorders: An item analysis. *Journal of Autism and Developmental Disorders, 44,* 283-293. doi: 10.1007/s10803-011-1278-x

Sparrow, S. S., Cicchetti, D. V., & Saulnier, C. A., (2016). Vineland adaptive behavior scales-Third edition (Vineland 3). San Antonio, TX: Pearson.

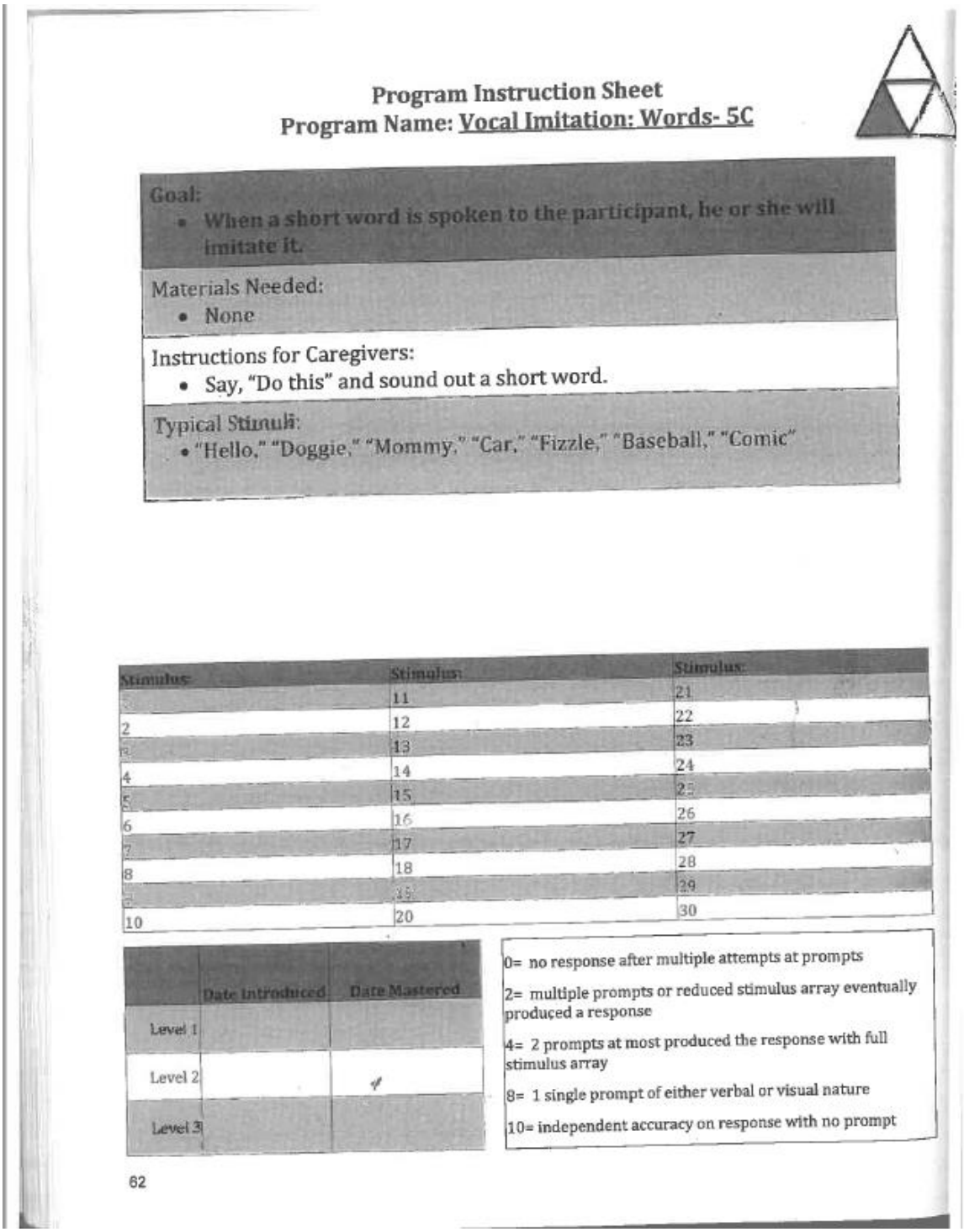
Torneke, N., (2010). Learning RFT: An introduction to relational frame theory and its clinical application. 9-33. Oakland, CA: Context Press.

APPENDICES

Appendix 1



Appendix 2



Program Instruction Sheet
Program Name: Vocal Imitation: Words- 5C

Goal: • When a short word is spoken to the participant, he or she will imitate it.
Materials Needed: • None
Instructions for Caregivers: • Say, "Do this" and sound out a short word.
Typical Stimuli: • "Hello," "Doggie," "Mommy," "Car," "Fizzle," "Baseball," "Comic"

Stimulus:	Stimulus:	Stimulus:
1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

	Date Introduced	Date Mastered
Level 1		
Level 2		✓
Level 3		

0= no response after multiple attempts at prompts

2= multiple prompts or reduced stimulus array eventually produced a response

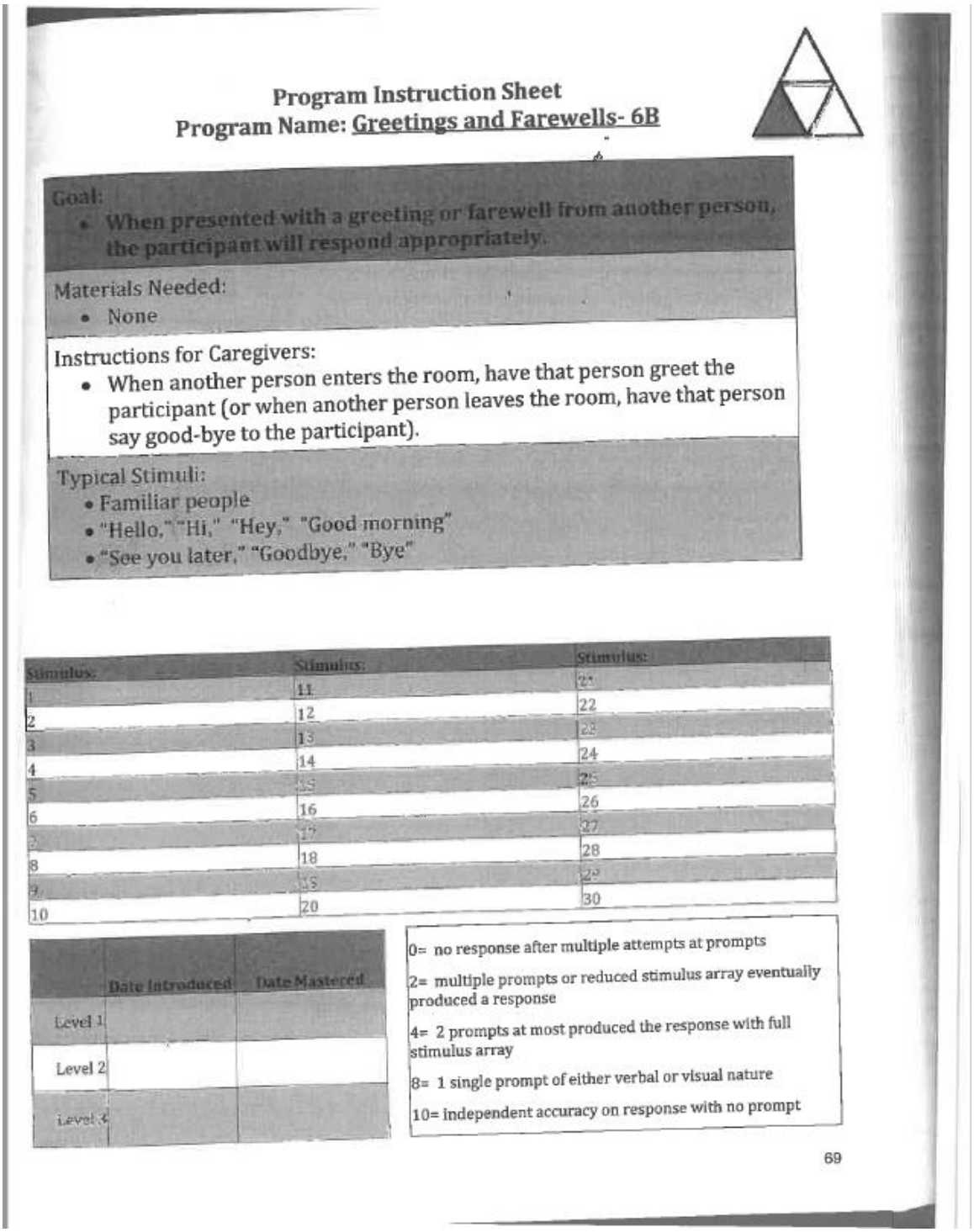
4= 2 prompts at most produced the response with full stimulus array

8= 1 single prompt of either verbal or visual nature

10= independent accuracy on response with no prompt

62

Appendix 3



Program Instruction Sheet
Program Name: Greetings and Farewells- 6B

Goal:
- When presented with a greeting or farewell from another person, the participant will respond appropriately.

Materials Needed:
- None

Instructions for Caregivers:
- When another person enters the room, have that person greet the participant (or when another person leaves the room, have that person say good-bye to the participant).

Typical Stimuli:
- Familiar people
- "Hello," "Hi," "Hey," "Good morning"
- "See you later," "Goodbye," "Bye"

Stimulus:	Stimulus:	Stimulus:
1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

	Date Introduced	Date Mastered
Level 1		
Level 2		
Level 3		

0= no response after multiple attempts at prompts

2= multiple prompts or reduced stimulus array eventually produced a response

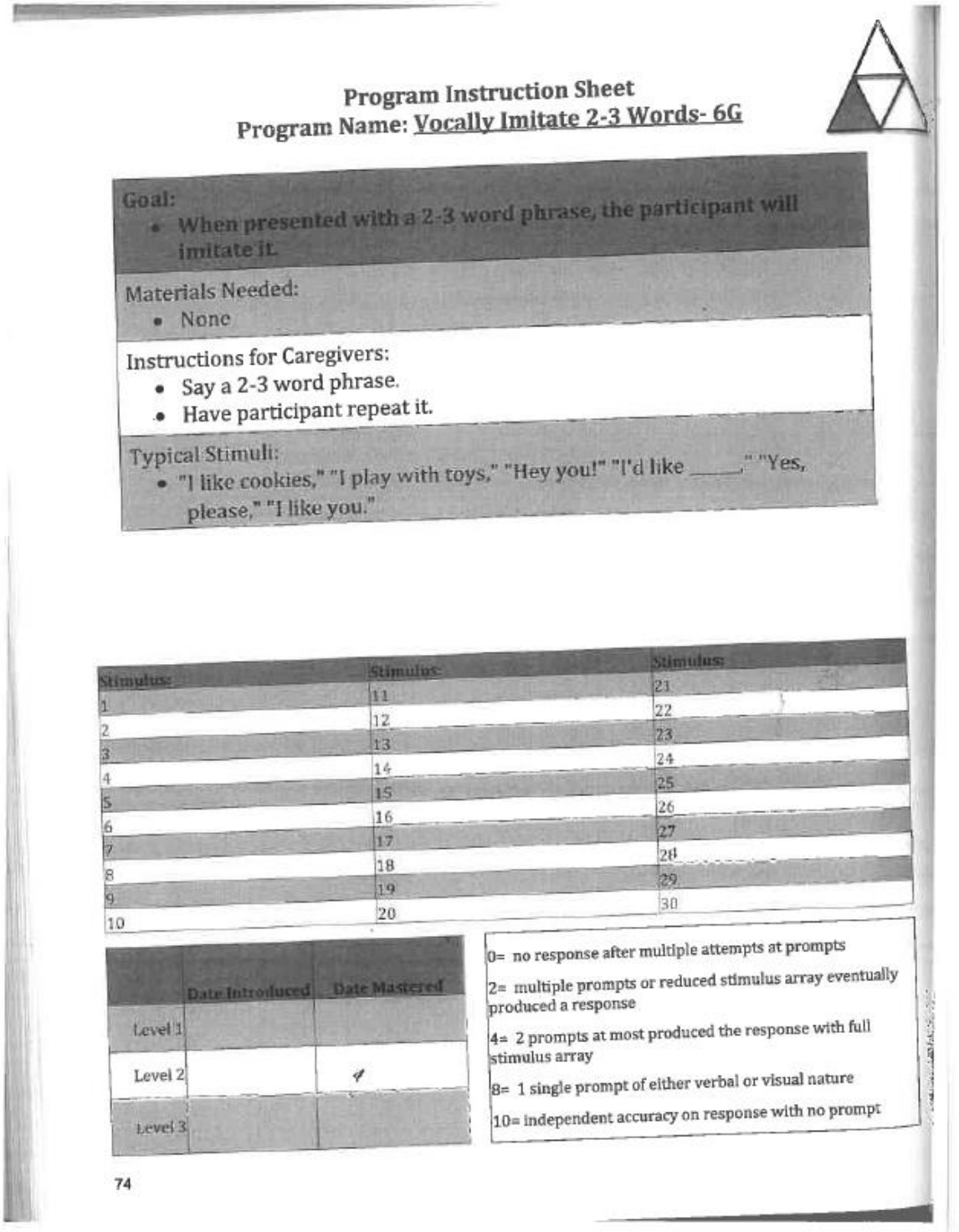
4= 2 prompts at most produced the response with full stimulus array

8= 1 single prompt of either verbal or visual nature

10= independent accuracy on response with no prompt

69

Appendix 4



Program Instruction Sheet
Program Name: Vocally Imitate 2-3 Words- 6G

Goal: • When presented with a 2-3 word phrase, the participant will imitate it.
Materials Needed: • None
Instructions for Caregivers: • Say a 2-3 word phrase. • Have participant repeat it.
Typical Stimuli: • "I like cookies," "I play with toys," "Hey you!" "I'd like _____," "Yes, please," "I like you."

Stimulus:	Stimulus:	Stimulus:
1	11	21
2	12	22
3	13	23
4	14	24
5	15	25
6	16	26
7	17	27
8	18	28
9	19	29
10	20	30

	Date Introduced	Date Mastered
Level 1		
Level 2		
Level 3		

0= no response after multiple attempts at prompts

2= multiple prompts or reduced stimulus array eventually produced a response

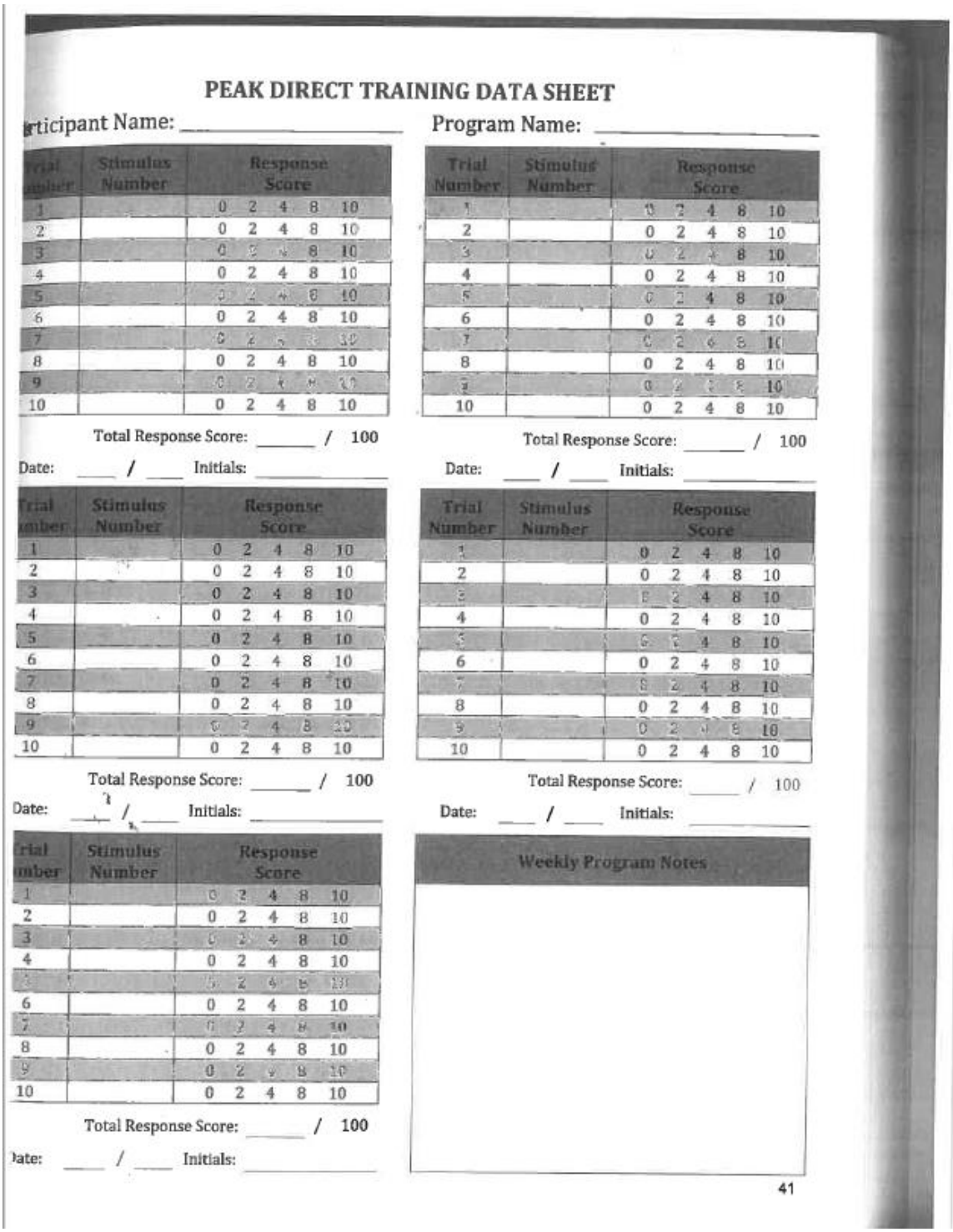
4= 2 prompts at most produced the response with full stimulus array

8= 1 single prompt of either verbal or visual nature

10= independent accuracy on response with no prompt

74

Appendix 5



PEAK DIRECT TRAINING DATA SHEET

Participant Name: _____ Program Name: _____

Trial Number	Stimulus Number	Response Score
1		0 2 4 8 10
2		0 2 4 8 10
3		0 2 4 8 10
4		0 2 4 8 10
5		0 2 4 8 10
6		0 2 4 8 10
7		0 2 4 8 10
8		0 2 4 8 10
9		0 2 4 8 10
10		0 2 4 8 10

Total Response Score: _____ / 100

Date: ____ / ____ Initials: _____

Trial Number	Stimulus Number	Response Score
1		0 2 4 8 10
2		0 2 4 8 10
3		0 2 4 8 10
4		0 2 4 8 10
5		0 2 4 8 10
6		0 2 4 8 10
7		0 2 4 8 10
8		0 2 4 8 10
9		0 2 4 8 10
10		0 2 4 8 10

Total Response Score: _____ / 100

Date: ____ / ____ Initials: _____

Trial Number	Stimulus Number	Response Score
1		0 2 4 8 10
2		0 2 4 8 10
3		0 2 4 8 10
4		0 2 4 8 10
5		0 2 4 8 10
6		0 2 4 8 10
7		0 2 4 8 10
8		0 2 4 8 10
9		0 2 4 8 10
10		0 2 4 8 10

Total Response Score: _____ / 100

Date: ____ / ____ Initials: _____

Trial Number	Stimulus Number	Response Score
1		0 2 4 8 10
2		0 2 4 8 10
3		0 2 4 8 10
4		0 2 4 8 10
5		0 2 4 8 10
6		0 2 4 8 10
7		0 2 4 8 10
8		0 2 4 8 10
9		0 2 4 8 10
10		0 2 4 8 10

Total Response Score: _____ / 100

Date: ____ / ____ Initials: _____

Trial Number	Stimulus Number	Response Score
1		0 2 4 8 10
2		0 2 4 8 10
3		0 2 4 8 10
4		0 2 4 8 10
5		0 2 4 8 10
6		0 2 4 8 10
7		0 2 4 8 10
8		0 2 4 8 10
9		0 2 4 8 10
10		0 2 4 8 10

Total Response Score: _____ / 100

Date: ____ / ____ Initials: _____

Weekly Program Notes

41

Appendix 6

PEAK Direct Training Pre-Assessment: Assessor Script and Scoring Guide	
Learner:	
Assessment Date:	
Assessor:	

Assessment and Scoring Directions:

Present the following items from each factor to the participant, repeating only the script in quotation marks aloud. Place the *"Pre-Assessment Script and Stimuli"* book between the learner and the assessor; present each item in sequence. Record the participant's responses on the accompanying scoring guide. Complete each item on the assessment. For each item presented to the participant, circle "1" for a correct response or circle "0" for an incorrect response. Example responses are provided. Add the total number of correct responses for each section to sum the score for that relation. Add the total for each relation to obtain the total score.

Score Summary:

Factor	Score	Max Score	Factor	Score	Max Score
Foundational Learning Skills		16	**Verbal Comprehension Skills**		16
Perceptual Learning Skills		16	**Verbal Reasoning, Memory, and Math Skills**		16
			Total Score:		**64**

Score	Factor Score Profile			
16	•	•	•	•
15	•	•	•	•
14	•	•	•	•
13	•	•	•	•
12	•	•	•	•
11	•	•	•	•
10	•	•	•	•
9	•	•	•	•
8	•	•	•	•
7	•	•	•	•
6	•	•	•	•
5	•	•	•	•
4	•	•	•	•
3	•	•	•	•
2	•	•	•	•
1	•	•	•	•
0	•	•	•	•
Factor	FLS	PLS	VCS	VMS

Appendix 7

Foundational Learning Skills (FLS)				
Item	**Script**	**Correct Response**	**Score**	**Notes**
FLS-1	Say, *"Look at me."*	Eye contact for 2 seconds	**1 0**	
FLS-2	Present the image of three cups, the left with a block below it (FLS-2a), then the image of three cups (FLS-2b). Say, *"Where did the block go?"*	Left cup	**1 0**	
FLS-3	Present the of 5 stars in an array. Say, *"Do this,"* and touch each star one at a time from your right to left.	Counts 1-5 while pointing	**1 0**	
FLS-4	Present the images of a block, a ball, and a cookie. Say, *"Choose one."*	Selects an item	**1 0**	
FLS-5	Say, *"Do this,"* and touch your nose.	Touches nose	**1 0**	
FLS-6	Say, *"Do this,"* and make a pincer grasp (pinching motion) with your fingers.	Makes pincer grasp	**1 0**	
FLS-7	Say, *"Do this,"* and purse your lips.	Purses lips	**1 0**	
FLS-8	Say, *"Do this,"* and raise your right arm, then touch your stomach.	Raises arm, touches stomach	**1 0**	
FLS-9	Say, *"Say...Ahh."*	Says, "Ahh"	**1 0**	
FLS-10	Say, *"Say...Book."*	Says, "Book"	**1 0**	
FLS-11	Say, *"Stand up."*	Stands up	**1 0**	
FLS-12	Present the image of a man waving. Say, *"Jim says, 'Hi!' What do you say?"*	Says a greeting	**1 0**	
FLS-13	Say, *"Say...The dog is big!"*	Says, "The dog is big!"	**1 0**	
FLS-14	Point to the block at the top of the page, with a block, a ball, and a pencil in an array below. Say, *"Show me same."*	Block	**1 0**	
FLS-15	Point to the apple at the top of the page, with a car, tree, and an apple in an array below. Say, *"Show me same."*	Apple	**1 0**	
FLS-16	Point to the T at the top of the page, with a B, 2, and T in an array below. Say, *"Show me same."*	T	**1 0**	
		Total:	**/16**	

Appendix 8

Perceptual Learning Skills (PLS)				
Item	**Script**	**Correct Response**	**Score**	**Notes**
PLS-1	Point to the dime at the top of the page, with a penny, a dime, and a quarter in an array below. Say, *"Show me same."*	Dime	**1 0**	
PLS-2	Present the images of a toy train, a ball, a bear in an array. Say, *"Show me the stuffed animal."*	Bear	**1 0**	
PLS-3	Present the images of a bowl, a toothbrush, and scissors in an array. Say, *"Show me the toothbrush."*	Toothbrush	**1 0**	
PLS-4	Present the images of a pizza, carrot, and a loaf of bread in an array. Say, *"Show me the bread."*	Loaf of bread	**1 0**	
PLS-5	Present the images of a fish, a horse, and a turtle in an array. Say, *"Show me the horse."*	Horse	**1 0**	
PLS-6	Say, *"Clap loudly."*	Claps loudly	**1 0**	
PLS-7	Say, *"What is your name?"*	Says his/her name	**1 0**	
PLS-8	Present the image of a chair. Say, *"What is this?"*	Says, "Chair"	**1 0**	
PLS-9	Present the image of a dress. Say, *"What is this?"*	Says, "Dress"	**1 0**	
PLS-10	Say, *"Point to your knee."*	Points to knee	**1 0**	
PLS-11	Present the images of an oval, a pentagon, and a rectangle in an array. Say, *"Show me the rectangle."*	Rectangle	**1 0**	
PLS-12	Present the images of the colors purple, brown, and white in an array. Say, *"Show me brown."*	Brown	**1 0**	
PLS-13	Present the images of a flower, a tree, and a cactus. Say, *"Show me the flower."*	Flower	**1 0**	
PLS-14	Present the H, M, and E in an array. Say, *"Show me H."*	H	**1 0**	
PLS-15	Present the image of a star. Say, *"What is this?"*	Says, "Star"	**1 0**	
PLS-16	Present the image of the color red. Say, *"What color is this?"*	Say, "Red"	**1 0**	
		Total:	**/16**	

Appendix 9

Verbal Comprehension Skills (VCS)				
Item	**Script**	**Correct Response**	**Score**	**Notes**
VCS-1	Say, *"Say...ribbit."*	Says, "Ribbit"	**1 0**	
VCS-2	Say, *"Stand up, turn around, and clap your hands."*	Stands, turns, and claps	**1 0**	
VCS-3	Say, *"What comes next? L-M-N-O-..."*	Says, "P"	**1 0**	
VCS-4	Present the image of a 5. Say, *"What number is this?"*	Says, "Five"	**1 0**	
VCS-5	Present the letters D, M, and A in an array. Say, *"Which letter says 'mmm'?"*	M	**1 0**	
VCS-6	Present the images of swimming, crawling, and crying in an array. Say, *"Which one is crying?"*	Crying	**1 0**	
VCS-7	Say, *"Tell me something that has spots."*	Example: Says, "Ladybug"	**1 0**	
VCS-8	Present the image of a doctor. Say, *"Who is this?"*	Says, "Doctor"	**1 0**	
VCS-9	Present the images of a person wearing a jacket, a person in the rain, and a person acting sad in an array. Say, *"Which one is feeling wet?"*	Person in the rain	**1 0**	
VCS-10	Present the images of a banana, a hat, and grapes. Say, *"Which one doesn't belong?"*	Hat	**1 0**	
VCS-11	Say, *"Bob's balloon popped. What might he be feeling?"*	Example: Says, "Sad"	**1 0**	
VCS-12	Present the images of clocks showing 9:30, 12:00, and 4:15 in an array. Say, *"Which one is 9:30?"*	9:30	**1 0**	
VCS-13	Present the word TOY. Say, *"What does it say?"*	Says, "Toy"	**1 0**	
VCS-14	Present the image of a tiger. Say, *"What group does this belong to?"*	Says, "Animal"	**1 0**	
VCS-15	Present the image of a children at school. Say, *"Where are they?"*	Says, "School"	**1 0**	
VCS-16	Present an image of a boy and a girl. Say, *"Show me his head."*	Boy's head	**1 0**	
		Total:	**/16**	